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THE WORLD OF COMPUTERS AND ELECTRONIC GAMES

## COMPUTER ARTISTS

How Teens Are Making Art—
And Money—With Computers

## CURTAIN UP!

Computers Light Up
Broadway Hit Shows

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Game Reviews
Programming:
Commodore,
Apple, TI,
TRS-80

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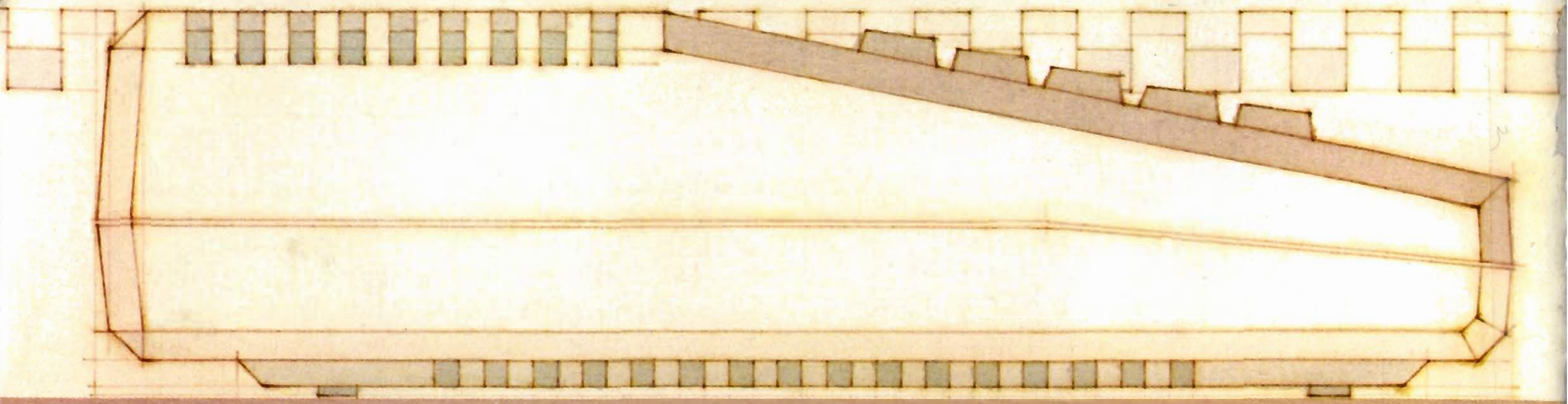

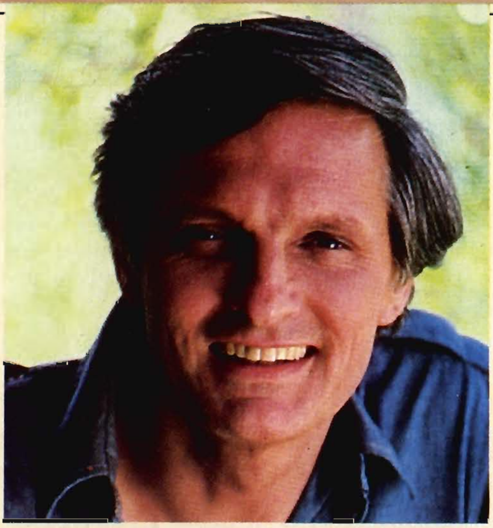

Computer enthusiast Alan Alda uses the ATARI 800XL Computer System. Alda reports: "It's going all the time!"

# Introducing the Atari® XL Home Computers: We made them smart enough to know you're only human.

ATARI 600XL
RESET
OPTION
SELECT
START
HELP
POWER

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The new ATARI XL Home Computers prove that you can blend state-of-the-art technology with good old fashioned friendliness. What's a friendly computer? For one thing, it's a computer that speaks your language. Both the new ATARI 600XL™ and the new ATARI 800XL™ Computers come with a built-in BASIC language that uses the same simple English you use to converse with the rest of the world.

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### The ATARI 600XL: It Gets Smarter As You Do.

With 16K of memory, the inexpensive ATARI 600XL can handle over a thousand programs: including education, home management, word processing and personal development. Like all ATARI Home Computers, it gives you 256 colors, four sound channels and Atari's unsurpassed graphics. But unlike a lot of other computers, the ATARI 600XL is ready to grow when you're ready to grow. Every ATARI XL Computer is fully compatible with every ATARI peripheral ("peripherals" are added on to expand what your computer can do).

ATARI peripherals include: a low-cost, letter-perfect printer for word processing. A telephone modem that lets you use your telephone to connect your computer to other computers thousands of miles away. A disk drive and a cassette recorder to store data. And Trak—Balls™ and joysticks to use with Atari's unequalled lineup of great arcade hits. An ATARI 600 XL Computer can be turned into a very brainy 64K computer at a very affordable price.

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With 64K of built-in memory (as much as the more expensive Apple and IBM computers), the ATARI 800XL can take on any of over 2,000 software programs. That's five times as many as a Commodore 64.

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## You'll do more with Atari Home Computers.

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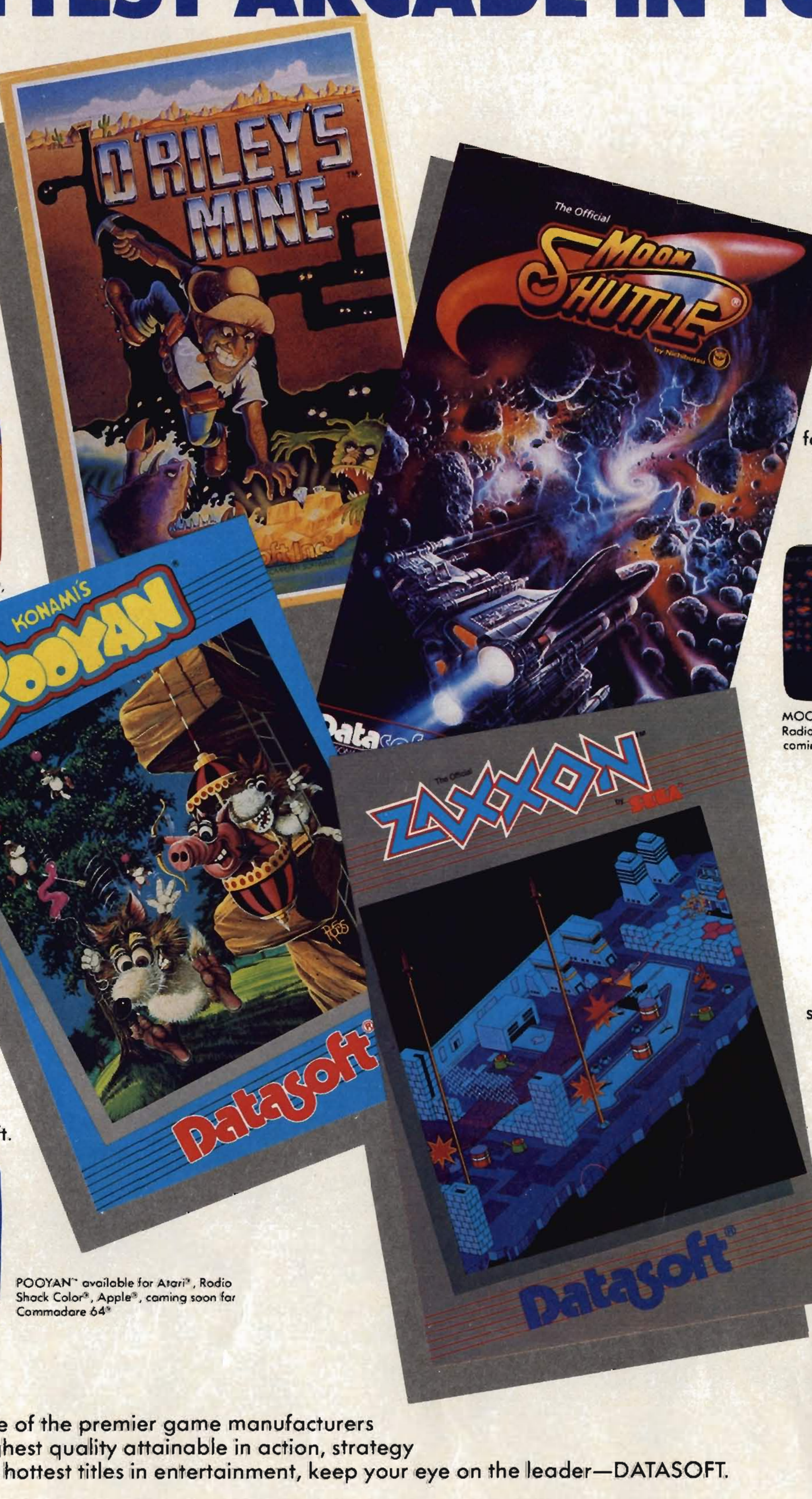
# TURN YOUR HOME INTO THE HOTTEST ARCADE IN TOWN



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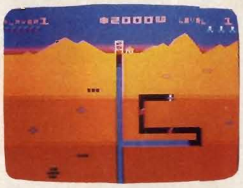
You're a mad Irishman digging your way through an abandoned mine filled with oil, coal, gold, rubies, diamonds—and hungry creatures. You'll need the luck of the Irish to survive, but with so much at stake, it's a chance you're willing to take.



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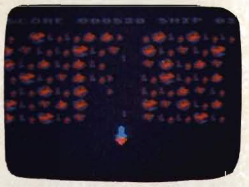

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One of the biggest arcade game hits from Konami is a game of fast action in life-and-death encounters. You battle a pack of hungry wolves eager to catch your defenseless piglets. You'll need quick reflexes and a good arm in the new arcade hit from Datasoft.

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Zaxxon has all the unique color graphics, super sound and unprecedented 3-dimensional effects that made it the star of the arcades. Maneuver your ship through the state-of-the-art defenses of the floating fortress to come face-to-face with the deadly Zaxxon Robot. This is the official home version of the Segas arcade hit.

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Our reputation as one of the premier game manufacturers assures you of the highest quality attainable in action, strategy and graphics. For the hottest titles in entertainment, keep your eye on the leader—DATASOFT.

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# MENU

FEBRUARY 1984

VOLUME 1, NUMBER 4

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Cover: Photograph © Tom Arma; Computer graphics from *Paint*, available from Reston Publishing Co. and from Atari.

# feed back

## QUEST QUESTION

I own a Vic-20 home computer. How can I tell if the games in your magazine will work on my computer? —Colleen Kenoe
St. Simons Island, GA

*Dear Colleen:*

*Usually we'll tell you right in our reviews which computers a game will play on. But in Jon Johansen's reviews of adventure games, "Best of the Quests" (November 1983), we goofed and left it out. For your information, here's a list of the computers these adventure games will play on:*

**Only Apple II:** Wizard and the Princess *(Sierra On-Line),* Wizardry *(Sir-Tech),* Kabul Spy *(Sirius),* Time Zone *(Sierra On-Line),* Zork I *(Infocom), and* Race for Midnight *(Avant-Garde Creations).*

**Atari 400/800 and Apple II:** Escape from Rungistan *(Sirius).*

**TRS-80 I/III, PET 64, Atari 400/800 and Apple II:** Telengard *(Avalon Hill).*

*Unfortunately, none of these games are for the Vic-20. Your computer doesn't have enough memory for most adventure games. The minimum amount of memory required is usually 32K, and the average about 48K.*

## RALF REQUEST

I would like you to have an article on RALF. He is a computer on the new show called *Whiz Kids* (CBS). —Neepa Choksi
Manahawkin, NJ

*Dear Neepa:*

*Funny you should mention* Whiz Kids. *Look for an article on the TV show and on actor Matthew Laborteaux in a coming issue of ENTER. And what article on* Whiz Kids *would be complete without a mention of RALF?*

## MOM READS ENTER

I think your magazine is fantastic...and my son, Jamie, enjoys it, too. I had him take it to school to share with the other children and his teacher. I have been recommending it to everyone with children or grandchildren between 8 and 16.

I work with computers as a systems analyst. I made the mistake of taking ENTER to work to read on my lunch hour. It was two days before I saw it again. The guys at work really enjoyed it.

I really like the way you thoroughly explain the more technical lingo my peers and I use. —Marcia Echols
Katy, TX

## FAN MAIL

I loved the magazine. It's the greatest, even if I don't have a computer. —Caren Malin
Miami, FL

## WRITE TO US!

We'd like to hear from you. Your ideas, questions and criticisms will help us make ENTER a better magazine. Send your letters to:

FEEDBACK
ENTER Magazine/CTW
1 Lincoln Plaza, NY, NY 10023

*(Continued on page 58)*

ENTER™

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# When you go in search of The Most Amazing Thing, don't expect to be home by dinner time.

Finding The Most Amazing Thing in the Whole Wide Galaxy isn't something you can do quickly.

In fact, you'll get so wrapped up in this computer game that you may have trouble coming back down to earth.

For starters, you get to fly, drive, bargain, eat, sleep, compose music, drill for oil, and speak 25 different languages.

Sound tough? Relax. You'll have the help of your old Uncle Smoke Bailey. He'll give you a B-liner (sort of a cross between a hot-air balloon and a dune buggy) to use on your journey. And he'll teach you about the Mire People and the strange languages they speak.

You'll visit the Metallican Auction, where you'll trade with tricky aliens. You'll shop for gadgets and gizmos to outfit the B-liner.

And you're off—in search of The Most Amazing Thing!

It will take time to find it.

But it'll be the best time you ever had.

IN SEARCH OF THE MOST AMAZING THING™ can be played on Apple,® IBM,® Atari,® and Commodore 64™ computers. To get started, see your local software dealer.

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We make learning fun.

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## questions & answers

# q&a

BY PHIL WISWELL

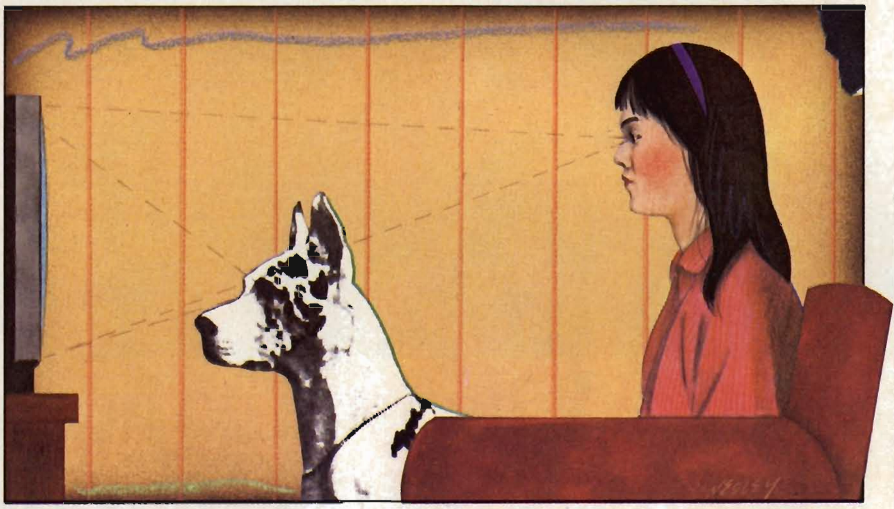
**DEAR ENTER:** What are sprites?
—John Reniers,
New York, NY

**DEAR JOHN:** A sprite is a computer drawing of a shape that can be moved around the screen in one piece. It might be an alien or a spaceship, or your character in a game. Sprites are used in many computers, including the Commodore 64 and Atari 800 (though Atari calls them player-missile graphics). Without the use of sprites, anything drawn on the computer screen would have to be redrawn line-by-line every time you wanted it to move.

In the Commodore system, which is typical, you can call up a "sprite design program," which displays a grid of 24 x 21 dots on your screen. You can "paint" your sprite with a choice of four colors. By assembling the proper combination of dots, you can make a recognizable shape. (Note: you can practice drawing a sprite on graph paper by coloring in certain blocks. In fact, this is how most programmers create their sprites. See "Pixel Perfect" on page 24, and you'll understand what we mean.)

Once a sprite has been defined, the computer "remembers" its shape, and can move it around the screen as a block. This allows the computer to use detailed, fast-moving graphics that take up little enough memory to leave room for the game rules and other information.

**DEAR ENTER:** Is it harmful to stay in front of a TV set or video terminal for long periods of time? If it is, what can I do to protect myself?
—Ana Bermudez,
Miami, FL



ILLUSTRATIONS © CARL WESLEY

**DEAR ANA:** So far, there is no evidence to suggest that exposure to video screens is harmful, but remember: the field is young and not much research has been done. Some people who work all day on video display terminals have complained that they end up with blurred vision, headaches, or itching eyes.

To study these problems, a panel was appointed by the National Institute for Occupational Safety and Health. After a two-year investigation the panel announced: "Our general conclusion is that eye discomfort, blurred vision and other visual disturbances, muscular aches, and stress reported among V.D.T. workers are probably not due to anything inherent in V.D.T. technology." The panel felt these problems were common on any job that required close visual work. They found no evidence that the problems were long-lasting.

Still, you can take sensible precautions when playing games or working with your computer by following these common sense rules:

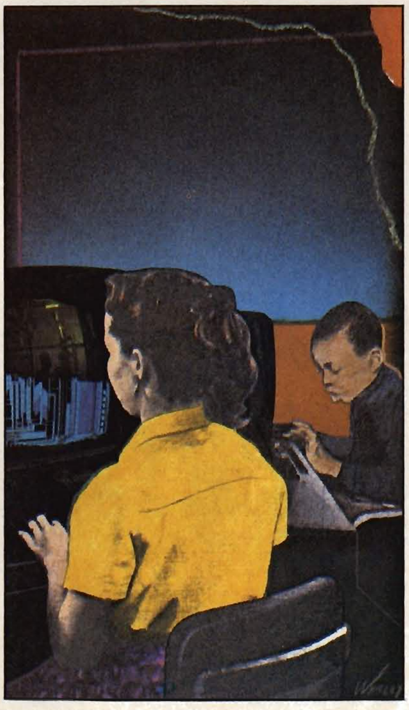
1) Work or play a comfortable distance from the set; that distance will vary from person to person.
2) Position the monitor at eye level and so the screen does not reflect other light sources.
3) Always have a source of light in the room other than the screen.
4) Periodically readjust the screen's fine tuning, contrast and tint to maintain the best picture.
5) Use a chair designed for typing or computer work that gives you lower back support.
6) Take periodic breaks away from the screen.

**DEAR ENTER:** Why are some computers easier to program than others?

—Jared Green,
New York, NY

**DEAR JARED:** They really aren't—at least not in the sense that one computer is easier for *everyone* to program. The ease of programming generally depends on two things: the person doing the programming and the type of programming desired—business, education, games, etc.

You may feel most comfortable with one computer for a number of reasons. Maybe, for example, you'll prefer one type of keyboard (not all have identical arrangements of the keys). Some keyboards have special function keys for particular tasks. Also, some computers are better designed for beginning programmers. Their BASIC statements will be closer to English or they'll have keys marked "help" or "problem," and will guide you along more slowly. But as you become more proficient at programming, you'll find you won't need those keys very often.



Most importantly, there are types of computers that handle one kind of program more easily than another. You should find out what type of programming the computer you buy does best. In some cases, such as science problems, you may need to get a computer that accepts a special language like FORTRAN. If you want to program games, you will want to make sure your machine can program in lots of different colors and sounds. Often, if you're having difficulty in programming, it may come down to the fact that you are trying to get the machine to do something it wasn't originally designed for.

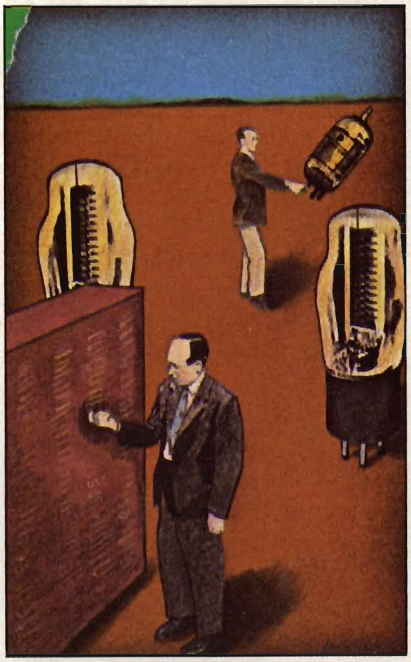
**DEAR ENTER:** Who invented computers?

—Jennifer Vazquez
New York City

**DEAR JENNIFER:** For centuries, people have been building machines that calculate. However, the modern computer that computes very swiftly using electronics was only invented a few decades ago.

Credit for inventing the modern computer generally goes to Dr. John Mauchly and Dr. J. Presper Eckert. These two scientists built ENIAC (Electronic Numerical Integrator And Computer) just after World War II. The ENIAC project cost $500,000. It was financed by the military, which used the computer to design the hydrogen bomb and to calculate missile trajectories.

However, Mauchly and Eckert weren't really the first electronic computer builders. During the 1930s, Dr. John Atanasoff of Iowa State University built a machine for $1,000 that he claims was the world's first computer. Dr. Atanasoff's machine was an array of vacuum tubes that were wired together. It was limited in scope compared to ENIAC, but Dr. Atanasoff's machine could perform large computations within seconds.



There were important connections between the two computers. First, Dr. Mauchly had visited Dr. Atanasoff and saw his machine in operation before ENIAC was built. Second, Mauchly later wrote to Atanasoff asking, "Is there any objection to my building some sort of computer which incorporates some of the features of your machine?"

It seems credit should go to all three men for their contributions to computer science. But the battle among computer scholars about whose machine was *really* the first computer is still going on.

*If you have a question about computers or video games, we'd like to help. Just send your questions to: Q&A, ENTER Magazine, CTW, 1 Lincoln Pl., NY, NY, 10023.*

# bits

## HAVE HARDWARE, WILL TRAVEL

Hiking hackers and computer campers take heed! An Oakland, California, company called Sage Designs has reached a new peak in Rocky Mountain high-tech—Compupak, a backpack built especially to carry your portable home computer.

The pack can carry up to 30 pounds of computer hardware. But don't pack your pitons and programs yet. The Compupak really isn't designed to take along on a wilderness trip. It's mainly for the wandering data searcher who must frequently cart a computer between home and work or school.

Of course, you could use Compupak to take your computer into the forest. But then, don't forget to pack a very, very long extension cord.

■ ■ ■

## BYTES FOR BREAKFAST

If you're crunching Alpha-Bits for breakfast now, you could soon be crunching numbers and computer bits on your school's new Atari computer equipment.

"Catch On To Computers" is a year-long campaign that lets school groups trade Post cereal proof-of-purchase seals for a variety of Atari computer equipment. For a specified number of seals—found on boxes of Alpha-Bits and 17 other Post cereals—schools can get everything from Atari 800 XL and 1450 XLD computers to cassette and disk drive units, printers and educational software.

This may be a tasty offer, but it's probably still a good idea to keep sliced bananas and milk out of your disk drive.

For more information, write:
Catch On To Computers, P.O. Box 3445, Kankakee, Illinois 60902.

■ ■ ■

## GOING UP?

It's the height of building chic, so don't be floored if the next time you get on an elevator, it *tells* you what direction it's going.

As the elevator moves, a husky male voice may announce what numbered floors are coming up and what's located on each floor.

A spokesman for the Otis Elevator Company of Ohio notes that the new, computer-simulated voice will help "humanize" elevators—notorious for being small, cramped spaces where no one talks. Otis's elevator also looks out for your safety, telling you to watch the closing doors or to get off if the lift is full.

So next time you're squashed between two Sumo-wrestler-sized people in a crowded elevator, you can take action. Put on your best husky voice and say: "I'm sorry. This elevator is overloaded. All those weighing over 250 pounds, take the stairs."

ILLUSTRATIONS © MARK S. FISHER

And don't forget, when people look around for the offending voice, just casually point to the electronic speaker.

## COIN-OPS COME HOME

*Asteroids* hasn't been blasted into outer space and *Dig Dug* hasn't gone underground, but you'd be hard-pressed to find these and other old games at your local arcade.

But your favorite arcade games don't *have* to fade away. Many distributors are now selling older coin-ops for use at home.

Alpha Omega Amusements & Sales of Edison, N.J., for example, offers such golden hits as *Space Invaders*, *Gorf*, *Galaxian* and *Defender*. The games, which sell for $250 and up, are completely reconditioned, according to Alpha Omega's Frank Seninsky. Electronic components are checked, cabinets are repainted and joysticks are repaired. Best of all, says Seninsky, the machines are set for free play, so you never have to spend a quarter.

For more information about buying an old arcade game machine, contact your local game distributor or: Alpha Omega Amusements & Sales, 3 Coral St., Edison, N.J. 08837, (201) 738-1800.

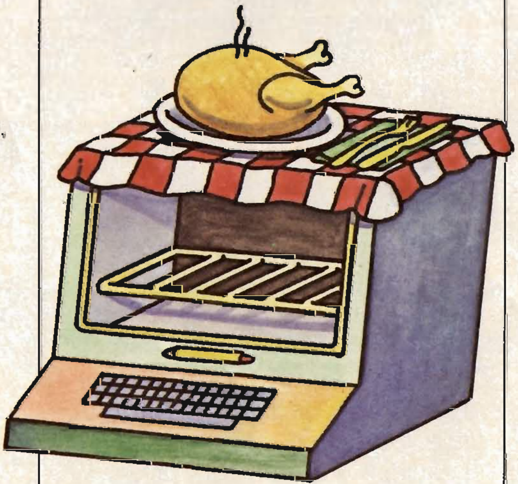
## TASTY HI-TECH

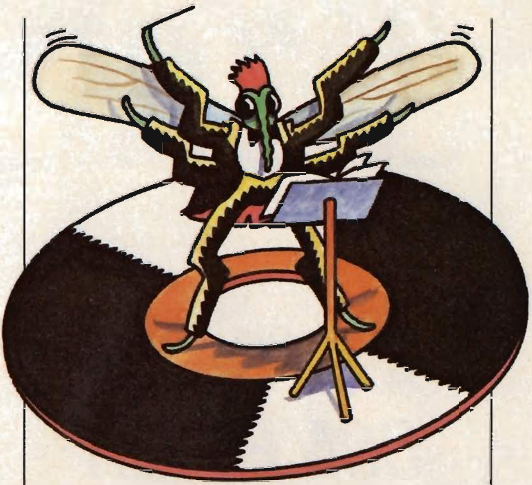
Software is not a new brand of dishes, and microchips are not the world's smallest snack food, but that won't keep computers out of the kitchen.

Yale University computer science student Kristian Hammond has just programmed the first computerized chef. The program—nicknamed WOK (Well-Organized Knowledge)—is more than a simple data base for storing recipes. WOK is a creative cook that knows when a dish needs a dash of nutmeg or a pinch of pepper.

The computer is programmed to understand differences in taste, flavor, spices and texture and to use this ability to develop new recipes, according to WOK creator Hammond.

Even with WOK, you'll still have to mix the ingredients and put them in the oven. But don't let guests know that. If dinner burns, you can always blame the computer.





## MICRO MOSQUITO

The latest buzzword in computers is—mosquito music. Chicago composer Robb Murray has written eight zippy tunes and packaged them on a 45 r.p.m. record called "Classical Mosquito!" The traditional compositions are programmed into and played by a TRS-80 computer and the Orchestra-80 music system. There's no *end* to the bugs in that program.

## BYTE BOPPER

When something goes wrong with your personal computer, you might be tempted to punch that PC or make applesauce out of that Apple. But hitting hardware can cause costly damage.

Now there's a way to get mad at your micro without making a major mess. The Byte Bat, a 17-inch-long foam rubber baseball bat, is specially designed for hitting home computers. Made from a particularly squishy plastic foam, the Byte Bat is a "harmless but satisfying way" to get angry at an uncooperative computer, according to its maker, MicroTie, Inc. of Albuquerque, New Mexico.

User-friendly computers, beware: Some of your users are apparently not very friendly.

# USER VIEWS

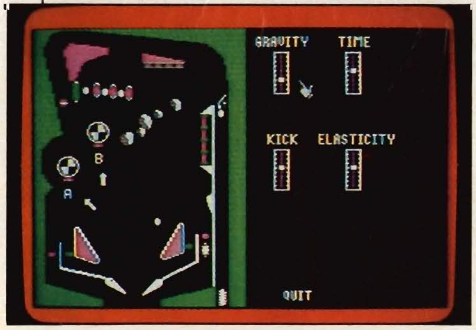
# BEST OF '83: COMPUTER GAMES

### BY PHIL WISWELL AND BERNIE DEKOVEN

The Emmys, the Oscars—and now, the BerPhils, computer gaming's ultimate award. If any category of entertainment deserves special recognition this past year, it is computer games. Software for home computers *(not* game systems) has come a long way. Now there are all sorts of games—not just simple shoot-'em-ups and chase-'em-downs, but games that take advantage of the computer's unique capabilities.

We selected all the games that follow for excellence in many areas, and we recommend all very highly. But we've taken our critique further by casting votes for our personal favorites within each category.

And now...the BerPhils!



*NOMINEES FOR BEST BUILD-IT-YOURSELF GAME:*

## PINBALL CONSTRUCTION SET

*(Electronic Arts; Atari, Apple, Commodore; Disk; $40)*

*"I love creating my own pinball games—more so than playing them."*—Phil

*"On the other hand, this disk lets you make some very good games."*—Bernie.

*Pinball Construction Set (PCS)* is just what it sounds like: a box of things for building your own unique games of computer pinball. On the screen you see an empty pinball table on one side and all the trappings of pinball games (bumpers, flippers, kickers, chutes, lights, drop-out targets, etc.) on the other.

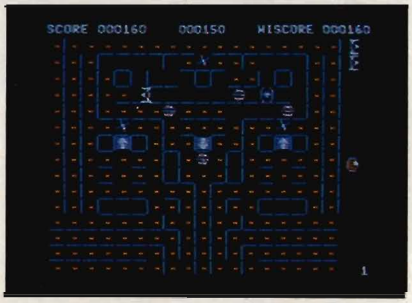
The amazingly powerful program works very well. Your joystick moves an on-screen hand to the object you want. A press of the button allows you to drag the object anywhere on the table. Nothing could be simpler to operate.

*PCS* comes with four demonstration games built in. The best way to start playing with *PCS* is by changing one of these four games. Add some targets. Take away a flipper. Increase the points. Initially, most people get wrapped up in building a game so full of targets and flippers that there is no way to lose. It can take a while to get serious about game design.

But everything works so logically and so well in this program that when you do get serious, you can explore every imaginable aspect of pinball. Don't be surprised to find that at least half the fun lies in the act of creation itself.

## MAZE CRAZE CONSTRUCTION SET

*(Data Trek; Apple; 48K Disk; $39.95)*



*"If you want an endless collection of challenging maze games, this single disk is the best investment."*—Phil

*"Pack up,* Pac-Man*!"*—Bernie

What *Pinball Construction Set* is to pinball, *Maze Craze Construction Set* is to maze/chase games. But it takes more patience to work with *Maze Craze.* In *PCS,* you can dramatically change a game just by moving a flipper. In *Maze Craze,* moving a dot, or an energizer, doesn't make as big a difference. You have to work harder to make something special.

There are some play-as-they-are games included, and you are free to change anything about them. You can start from scratch by calling up one of 10 basic maze outlines. Any five mazes may be strung together into a game.

You can add or delete lines, place dots or energizers, and create monsters in different locations and with different "personalities." You can also construct exit tunnels that let you escape, and you can determine your speed. That's a lot to play around with, but there's even more. A character editor lets you create your own screen-size game characters, pixel by pixel, while providing a view of what they will look like at the smaller, regular size. You can flip the shape, paint it different colors, and experiment until you have just what you want.

◆◆◆

## LODE RUNNER

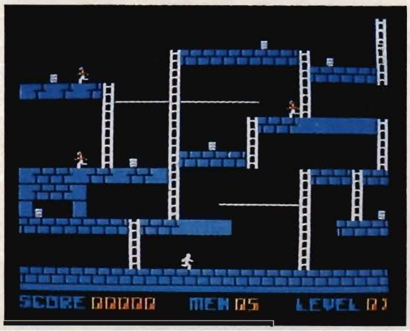
*(Broderbund; Apple, Commodore, Atari; also available soon on IBM-PC; Disk; $34.95)*

*"A game with 150 not-too-different screens."*—Phil
*"But the game generator alone is worth the price of admission."*—Bernie

If you are familiar with *Miner 2049er*, *Jumpman*, or *Space Panic*, you will know right away what to do in this game. You run, climb, jump, avoid your enemies (or trap them), and grab all the gold on each level.

What you might not notice in your rush to conquer all 150 available screens is that a second part of the disk allows you to create your own version of this game.

This screen generator is wonderful and even simpler to operate than *Pinball Construction Set*: Four keys move the cursor and you can place ladders, walls, blocks or gold, monsters and traps wherever you like. Once you have a number of different screens, you can put them together in any order and save them all on a disk as one complete game. Or you can make individual screens to practice your weak points in the regular game.



And talk about a "player-friendly" game—this one comes with a cheat option! You can start *Lode Runner* on level 149 with 149 lives if you like. In addition, there is a full-screen secret message in one of the levels, but we'll let you find out which one.

### AND THE WINNER IS...

**PHIL:** The winner in my mind is clearly *Pinball Construction Set* for its incredible variety, detail, and stunning graphics. But if you like mazes as much as you like pinball, *Maze Craze* is just as good. I guess *Lode Runner*, though unbeatable among climbing games, was my least favorite.

**BERNIE:** I give *PCS* the top honor, too. The graphics are phenomenal, because the game was designed by a craftsman, Bill Budge. The three programs in this category deal with very different kinds of games, but all represent a new trend in game design that is rocking the industry, a whole new class of computer games...

**PHIL:** ...That are not fixed in place at the factory. They are lumps of highly sculptable clay that help shape themselves.

### *NOMINEES FOR BEST GRAPHIC ACTION GAME:*

◆◆◆

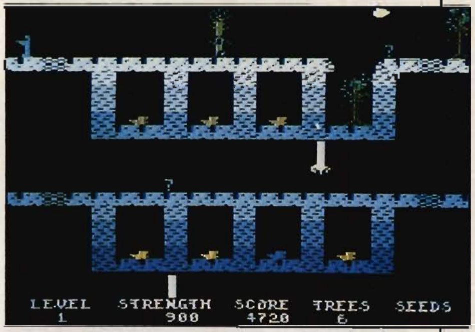
## NECROMANCER

*(Synapse; Atari Computers: Disk; $34.95)*

*"Casting magic spells may seem less violent than hurling laser-bolts, but they have the same deadly effect."*—Phil
*"Actually, being a magician is more challenging than it is violent."*—Bernie

In *Necromancer*, you are a magician who casts spells. There are three acts in the game, and the story progresses like three chapters in a book. What you accomplish in each act affects how well you do in the next.

In Act I, your character has 10 seeds to plant and nurture into adult trees, and a certain amount of time (strength) to do it. This part of the game is very open and has much strategic depth. Learning where to plant your trees and how to defend against attacking forest spiders takes a lot of playing.



There are five levels of vaults in Act II, and each contains spider larvae. Their eggs must be eliminated here or you'll face them in Act III as adults. Fortunately, the trees you grew in Act I can help.

*(Continued on page 12)*

*(Continued from page 11)*

Cast the proper spell on a tree, move it over a vault, and it will grow roots to puncture the brick walls and destroy the eggs. This is a timing challenge.

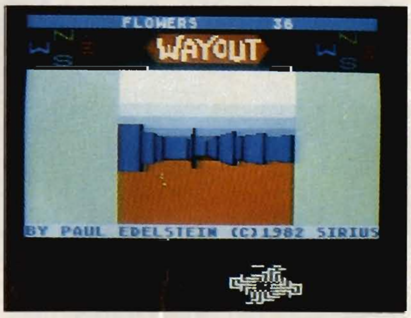
The object of *Necromancer's* final act is to make 13 gravestones disappear by walking over them. But plan a careful route—you have to avoid spiders and the Necromancer himself.

Overall, this graphically sparkling contest is like a very exciting, complex arcade-style game. If it were available as a coin-op, we're sure it would be the first 75-center.

## WAYOUT

*(Sirius; Apple, Atari, Commodore 64; Disk; $39.95)*

*"This is the best looking 3-D, first-person perspective maze I've seen."*—Phil
*"But one of the hardest to control."*—Bernie



*Wayout* is a wonderfully complex maze with an even more wonderfully simple object: find your way out. The visual treat of looking down the hallways and turning into corridors is a splendid illusion.

You are equipped with two aids to your limited line of vision—a compass and a map. Sadly, just about when you've figured out how invaluable these items are, an enemy appears and steals one—or both! And either item without the other is not really helpful. The compass shows your direction, but if you can't see your position on the map, what good is direction?

The game *is* a little difficult to control and some of the illusions—such as the flies—don't work too well. The flies are supposed to show the direction of the wind, which could be coming from the way out. But the wind option is hard to understand. Still, at times these flies will be your only clues about which way to turn.

## CROSS FIRE

*(Sierra On-Line; Apple; Disk; $29.95)*

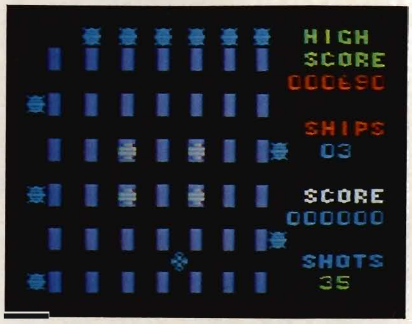
*"More senseless slaughter."*—Phil
*"Senseless violence, perhaps, but an intense challenge to hand, eye, and mind."*—Bernie

You move your character around what looks like 36 squared-off city blocks, and fire in all four directions at aliens that enter the rows and columns from the perimeter. That's all there is to *Cross Fire*, but it turns out to be more than enough.

You see, this isn't a shoot-'em-up as much as it is a planning game. You can see all your attackers and have time to shoot them, *if* you do it in an orderly fashion. But things happen in so many different directions that finding a safe solution is quite challenging.

To progress to the second and higher levels, you have to eliminate all the aliens. That's not easy, because they merely transform themselves into nastier creatures the first four times you shoot them.

Playing *Cross Fire* looks and feels simple. Everything is right there for you to see and you always have enough time—*if* you keep the big picture in mind. But when you concentrate on one area of the screen for too long, somehow a creature sneaks up on you!



### AND THE WINNER IS...

**PHIL:** I picked *Wayout* in this category for its simplicity—all I have to do is find my way out. And I don't have to shoot anything! I'm not very good at *Necromancer* or *Cross Fire*, but they are unique games for hard-core arcade fans.
**BERNIE:** I find all three games too difficult for my personal taste. However, I would have to pick *Necromancer*. It is the most imaginative in theme and fantasy, and it takes me to a new level of fantasy/action in games.
**PHIL:** I'd like to add another point for *Wayout*. It offers a selection of so many different mazes and skill levels that you feel like you have more than a single game.

---

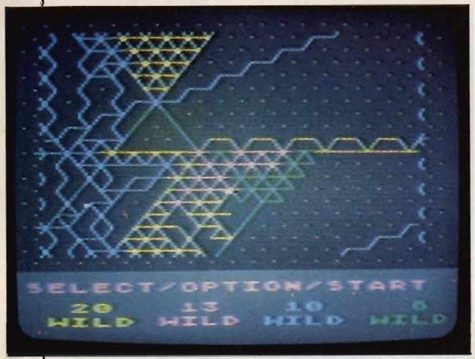
### NOMINEES FOR BEST MULTI-PLAYER GAME:

## WORMS?

*(Electronic Arts; Atari, Commodore; Disk; $35)*

*"One of the deepest, most abstract strategy games on the computer."*—Bernie
*"I love the feature that allows you to save an 'intelligent' worm on disk for use in future games."*—Phil

*Worms?* is based on something Martin Gardner, the noted gamester, described in a *Scientific American* column: the training of theoretical, mathematical worms to behave with predictable movement patterns. Sounds strange? Believe us, *Worms? is* strange. But it is also beautiful. The object for one to four players is to train a worm to move around the screen by itself. The dots on the board illustrate directions of movement.



The object of the game is to capture more dots than your opponents.

Your worm begins near the center as nothing but a short line. You can angle it in six directions and send it off in whatever direction you select. If a worm encounters a situation it has not "seen" before—such as running into another worm—it will stop and wait for instructions.

Worms die when they enter corners from which there is no open route, but the game continues until the last player has been eliminated. Then, the scores are tallied and displayed graphically: your captured territory glows on-screen in a most pleasing fashion.

Every time you give an instruction to your worm it becomes a little "smarter," so if you save those instructions on a disk, you have a trained worm ready for your next game!

## WIZARDRY

*(Sir-Tech; Apple II; 48K Disk; $40.95)*

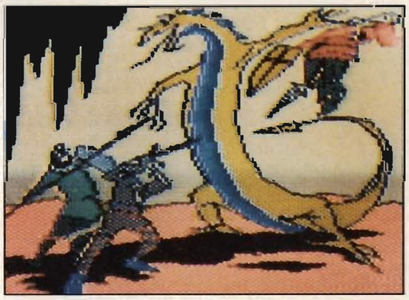
*"You can have up to six players, but unfortunately, their characters must move as a group."*—Phil

*"But* Wizardry *is the most accurate translation of* Dungeons & Dragons *to the computer."*—Bernie

It takes a long time to begin playing *Wizardry,* because you have to create your characters.

Each character has varying degrees of attributes like strength, agility, intelligence, armor, weapons, and magical powers. The character must also belong to one of three classes: good, neutral, and evil.

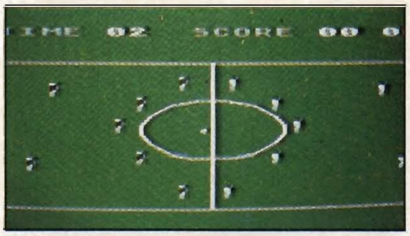
Once your band gets on its way, you'll meet hundreds of different kinds of monsters to combat, cast magic spells over or simply run away from. Most of the game is done with text, in such an exciting way that you really get involved in the adventure. If adventures turn you on, this one is the beginning of what could be a lifelong pursuit.



## SOCCER

*(Thorn/Emi; Atari Computers; 16K Cartridge; $30.00)*

This exciting sports game is the first to truly encourage teamwork. We reviewed it in depth in last November's "User Views" column.



### AND THE WINNER IS...

**PHIL:** These are three very different games. The common denominator is how they accommodate at least four players at a time. So, it's difficult to pick a winner. Still, *Wizardry* stands out as a classic.

**BERNIE:** *Wizardry,* definitely a classic, also gets my vote. It is an amazing example of the art of programming. It has great depth, detail and complexity.

## HONORABLE MENTIONS

Our list is short on games for the TI, IBM, VIC-20, and TRS-80 computers. So we've chosen the best '83 games for those systems.

**IBM PC:** *Temple of Apshai* (Epyx): Fantasy role-playing in a dungeon. *Flight Simulator* (Microsoft): Best simulation we've ever seen.

**TI99/4A:** *Championship Baseball* (Milton Bradley): A very lively game, thanks to voice recognition. *Moon Mine* (Texas Instruments): A fast-moving action game.

**VIC-20:** *Serpentine* (Creative Software): Even faster action. *Ricochet* (Epyx): Created by ENTER's Bernie DeKoven, picked by Phil Wiswell: A thinking player's game.

**TRS-80:** *New World* (Epyx): One to three players colonize America. *Starcross* (Infocom): All text, it's like an interactive sci-fi novel.

## random access

# DON'T SELL ME SHORT

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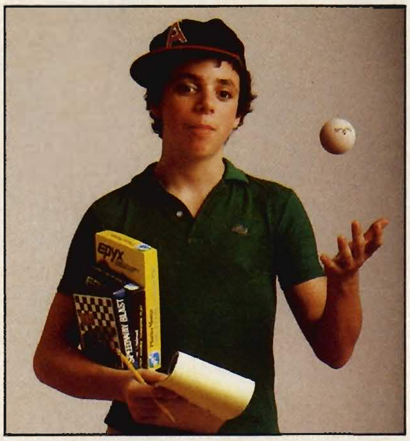
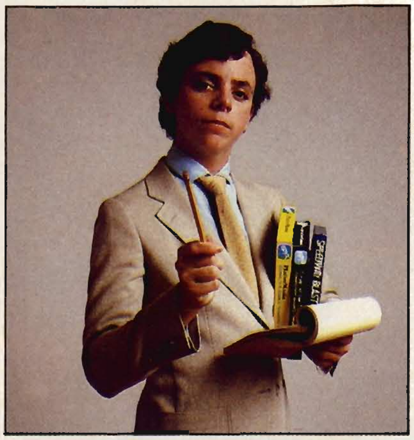


**Was I just some little kid...**



**...or a brainy computer whiz?**

### BY GREG TRAUTMAN

Imagine a baseball fanatic being offered a job as batboy for his favorite team, or a chocolate lover getting a job in a candy store. That's how I, a computer hacker, felt when I was offered a job in a large computer store. The job sounded easy enough. All I had to do was talk to people about computers. And to think—I was even getting paid!

But, just as the batboy learns that carrying bats is tiring, and the chocolate lover learns that you can eat too many chocolates, I learned that being a 13-year-old computer salesman wasn't the dream job that I'd imagined.

My biggest problem was dealing with adults who had trouble accepting the fact that a kid might be able to help them with their problems. You'd be surprised at how many times a customer would respond to my helpful greeting with a gruff, "No thanks, I'll wait for a salesman to help me." After learning that I *was* a salesman, adults often responded in one of two ways. The first group refused to believe that I could be of any help. I guess they figured that my father owned the store. They would wander off, waiting to speak to one of the other salesmen. The second group was instantly convinced that I was a genius who knew everything about computers and was probably four grades ahead of my age group. In case you think I'm exaggerating, let me give you some examples.

One day, a young woman came into the store. As usual, I let her look around before asking if she needed help. When I did, she smiled and said she'd wait for one of the other salesmen. Both of them were busy at the time. About 10 minutes later, she left since the salesmen were still busy. She wouldn't have anything to do with me. She refused to believe that I knew as much as they did, merely because of my age. It really made me mad.

On another day, a man came in and pulled out a program he was having trouble with. He wanted me to look it over, but it was written in a language I didn't understand. I told him, but he didn't believe me. "You don't want to help me because I'm not buying a computer," he said angrily, and left the store.

Of course, not all customers have been problems. I helped many of them buy a computer that was right for them. For example, one day a well-dressed man came into the store and we sat down to talk. At first he was amused that I was so young. But as we continued to talk, he forgot about my age. He listened carefully to my answers and took notes. After speaking with me for more than an hour, he thanked me and left. I was a little disappointed. But to my delight, he returned the next day to buy the system that I'd recommended.

Now, five years later, I have held many computer-related jobs. In all of them, my age has created some difficulties.

Things are getting better, though. For one thing, computers are more a part of everyday lives today than they were five years ago. And now, the number of teenage computer enthusiasts is many times greater than it was when I first worked in a computer store. This magazine geared to teens is a perfect example of that. But there are still times when someone will make a snide comment about my age and I will suddenly feel like that 13-year-old kid fighting to prove myself in an adult world. I'm a computer veteran, but I'm afraid that, to a lot of people, I'm still just a kid.

*GREG TRAUTMAN, a senior at Hunter College High School in New York City, worked at a computer store for six months.*

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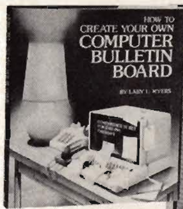
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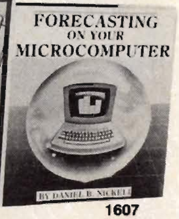
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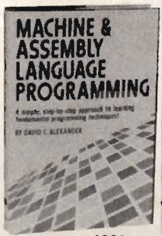
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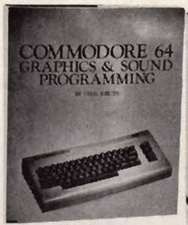
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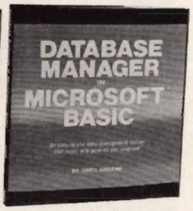
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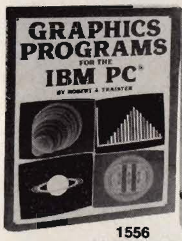
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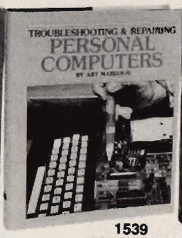
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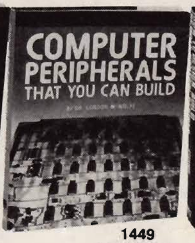
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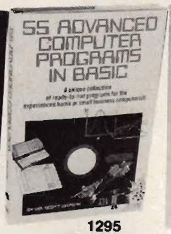
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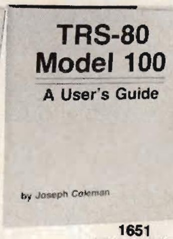
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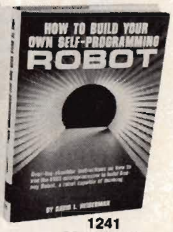
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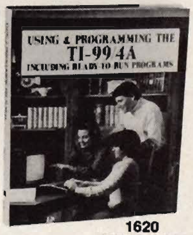
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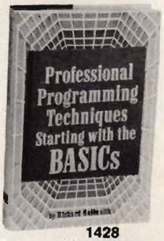
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# COMPUTER DRAWING

## AT 17, KEITH AND CRAIG ARE COMPUTER GRAPHICS PROS

### BY HEIDI WALDROP

*Craig and Keith create computer art for many major companies. Their graphics earn them $200 to $300 per project.*

At first, the only thing that seems unusual about Keith and Craig Mortensen is that they are twins. Both are 17, blond, athletic, and fond of puns and pranks. Like many other siblings, they fight with each other—most frequently, probably, over who gets to use the computer in their bedroom. Here is a typical scene:

"I beat you in tennis," crows Craig, "so I get to work on it first."

"Okay," Keith replies, disappointed. "But I'm timing you. One hour and then it's mine." He drops his tennis racket on the bed and lies down to wait his turn.

The Mortensens look like, act like—and are—typical California kids. Except for one thing: they are among the best-known professional computer graphics experts in their area, which happens to be the computer center of the U.S.A., Silicon Valley. In addition to doing homework and working on the yearbook at Fremont High School, Keith and Craig are the heads of a corporation—Mortensen Computer Graphics, Inc. They create computer art for clients like Apple Computers, Applied Software Technology, and Chambered Nautilus Software. Their work earns them at least $200-300 per project.

The work the twins do is part drawing, part programming. Companies tell them what kinds of pictures they want to display on the computer screen. It might be a diagram for a sales presentation or an ornate picture of a vintage automobile for a showroom display. The Mortensens' artistic talent comes in when they turn the client's ideas into a drawing on paper. Then they use their computer knowledge to transfer the drawing to the computer screen.

The Mortensens' artwork has become so popular that you've probably seen it. Many of the best-looking Apple graphics displayed in computer stores, at fairs, at demonstrations and in ads were created by the 17-year-old twins in their Sunnyvale, California, bedroom.

Keith and Craig have been drawing since they were in grammar school, and they began working with their school's computers in eighth grade. But if you had told them a few years ago that they would be computer company executives, they probably would have thought you were crazy. Why? Because the first time the Mortensen twins saw a computer, neither one was very impressed.

"Our friends kept talking about the new computer lab, so we went in to take a look," recalls Craig. "It wasn't much more than a typewriter. We were expecting some space-age thing, like in *Star Wars*."

But they were curious and decided to take a calculator/computer class to find out more. The course was interesting enough to convince Keith and Craig to get a computer at home. The tough part was convincing their parents they were serious about it. "They thought it was just another toy we would put in the closet," says

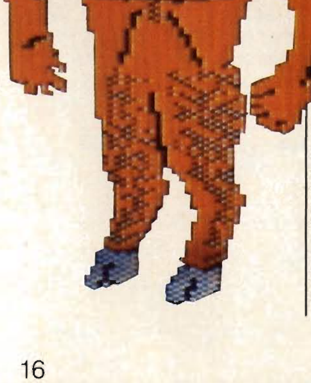
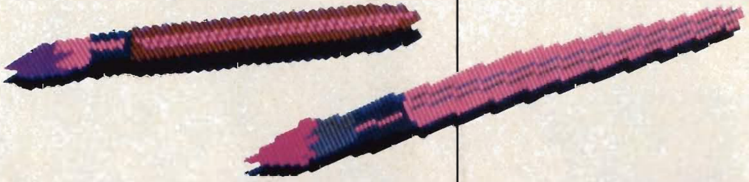


PHOTO © HEIDI WALDROP

GRAPHICS

# POWER



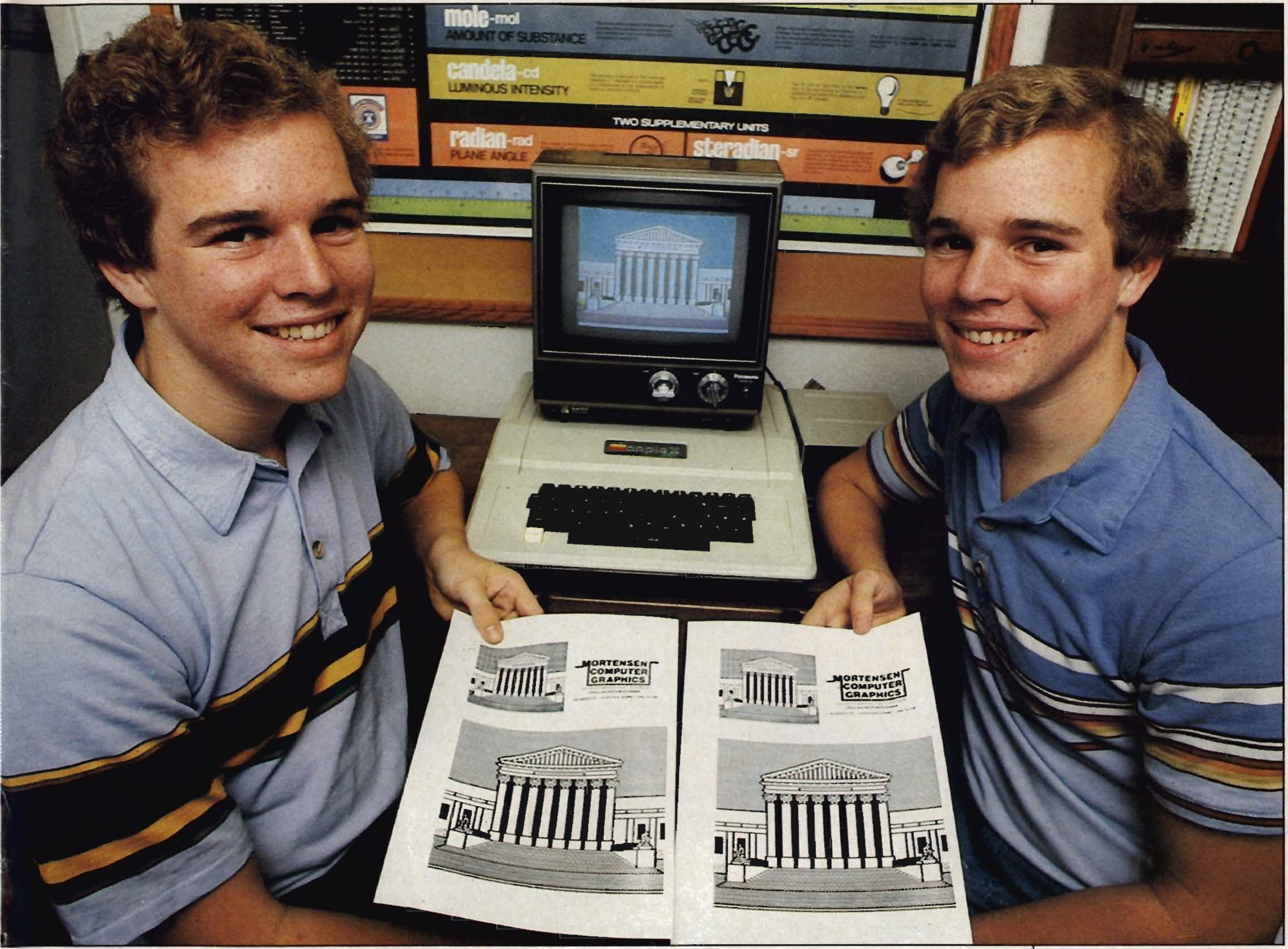

mole-mol
AMOUNT OF SUBSTANCE
candela-cd
LUMINOUS INTENSITY
TWO SUPPLEMENTARY UNITS
radian-rad
PLANE ANGLE
steradian-sr
MORTENSEN COMPUTER GRAPHICS
MORTENSEN COMPUTER GRAPHICS

PHOTO © ED KASHI

**As computer artists, Keith (left) and Craig Mortensen are in very good company.**

Craig, recalling their efforts.

"We thought they'd get tired of the computer after a while," adds Mrs. Mortensen. "But they were really serious about it, and now they're making money."

Keith and Craig used the computer at their school until the end of the school year. Then their father brought home a 32K Apple II, and the boys used an old tape recorder and black and white TV with it. They got a disk drive for Junior High school graduation and a color TV for their birthday. It was a good beginning.

The twins tried to create graphics as soon as they learned how to work the computer. "We started plotting low resolution graphics in BASIC, but it was too tedious and took too much time," says Keith. Keith and Craig had heard about the Apple graphics tablet and wanted to experiment with it. So they worked out a deal to have Computers Plus, a local store, loan them one. In return, Keith and Craig did computer graphic artwork that

ILLUSTRATION/COMPUTER GRAPHIC © INA SALTZ, CREATED ON A NORPAK IPS 2

*Craig and Keith are unusual. They combine technical know-how with artistic talent, says their supervisor, Apple's Carolyn Stauffer.*

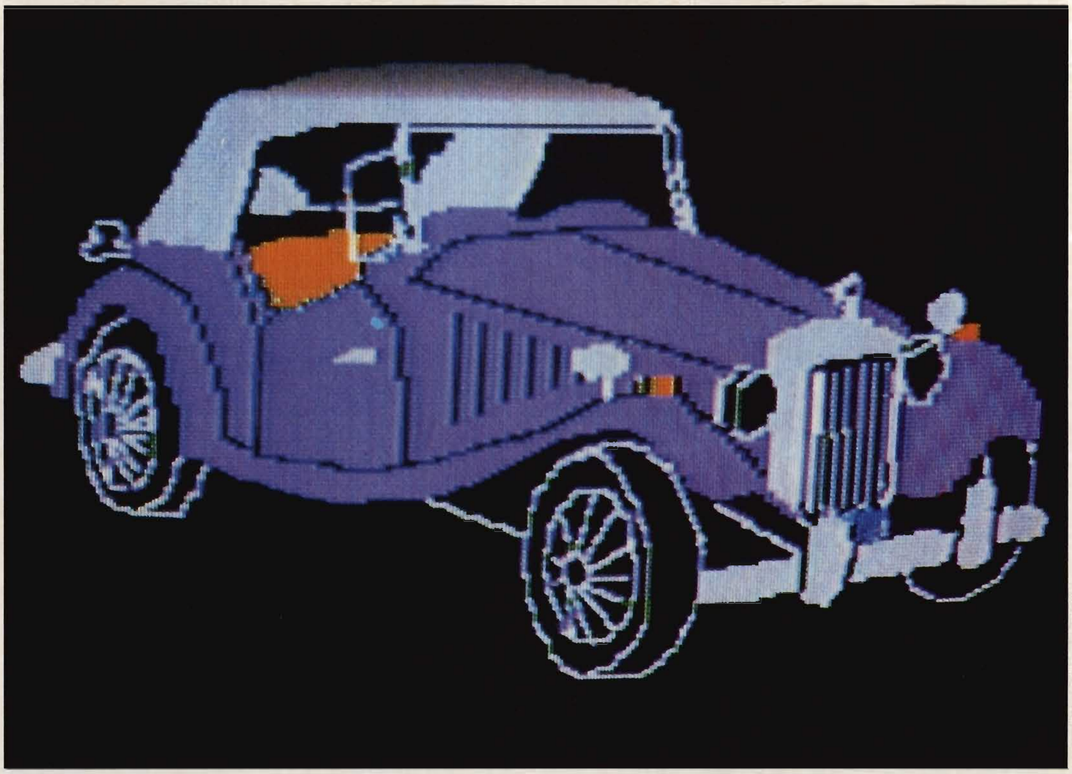


PHOTO © HEIDI WALDROP

the store owners used to demonstrate on the Apple computers they were selling.

About that time, their teacher's recommendation netted Craig and Keith a part-time clerical job at Apple. Their job consisted of entering general business data and helping out around the office at the Apple Education Foundation. Six months later, the twins' supervisor Carolyn Stauffer recommended that Apple let the boys produce a demonstration slide show to go in the kit of a new Apple product called *Profiles*.

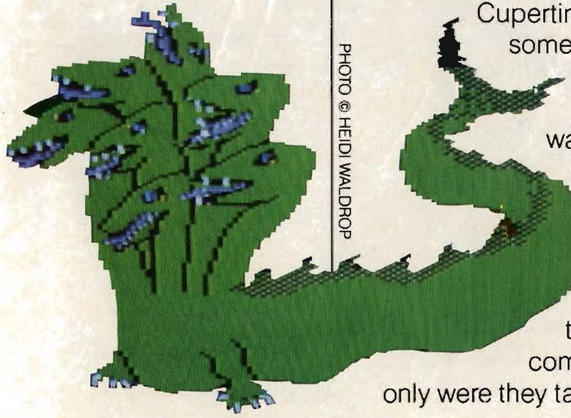
"When I met them, I knew they were talented artists," says Ms. Stauffer, administrator and manager at Apple's Cupertino offices. "They brought some of their work with them, and it showed they had a lot of imagination. It was clear that they are artists in their own right.

"I went out of my way to find work for them," she continues. "I thought they had an unusual combination of talents. Not only were they talented artists—but they could apply their art abilities to graphics, and they had good technical abilities."

Keith and Craig were excited and a little nervous on that first job. "We had drawn a lot of graphics before, but it was a big company and we wanted to do well," says Keith. Apple liked the job they did, and the Mortensens have been doing graphics for the company ever since.

One of the best things about working for Apple, Craig and Keith agree, is that they get to see new equipment before almost anyone else. They tested the Apple IIe five months before the public got to see it. "We'd have to hide it under the bed when our friends came over because Apple wanted us to keep it a secret," says Keith. "We wanted to say, 'Hey, we know this,' but we couldn't." Then, when the IIe came out, nobody believed they had tested it. "Our friends said, 'Oh, sure you did.'" recalls Craig.

Today, Apple is just one of the Mortensens' clients. Most of their work is for small companies that are marketing their own software. The companies come to Keith and Craig to create computer pictures for their sales presentations, or to



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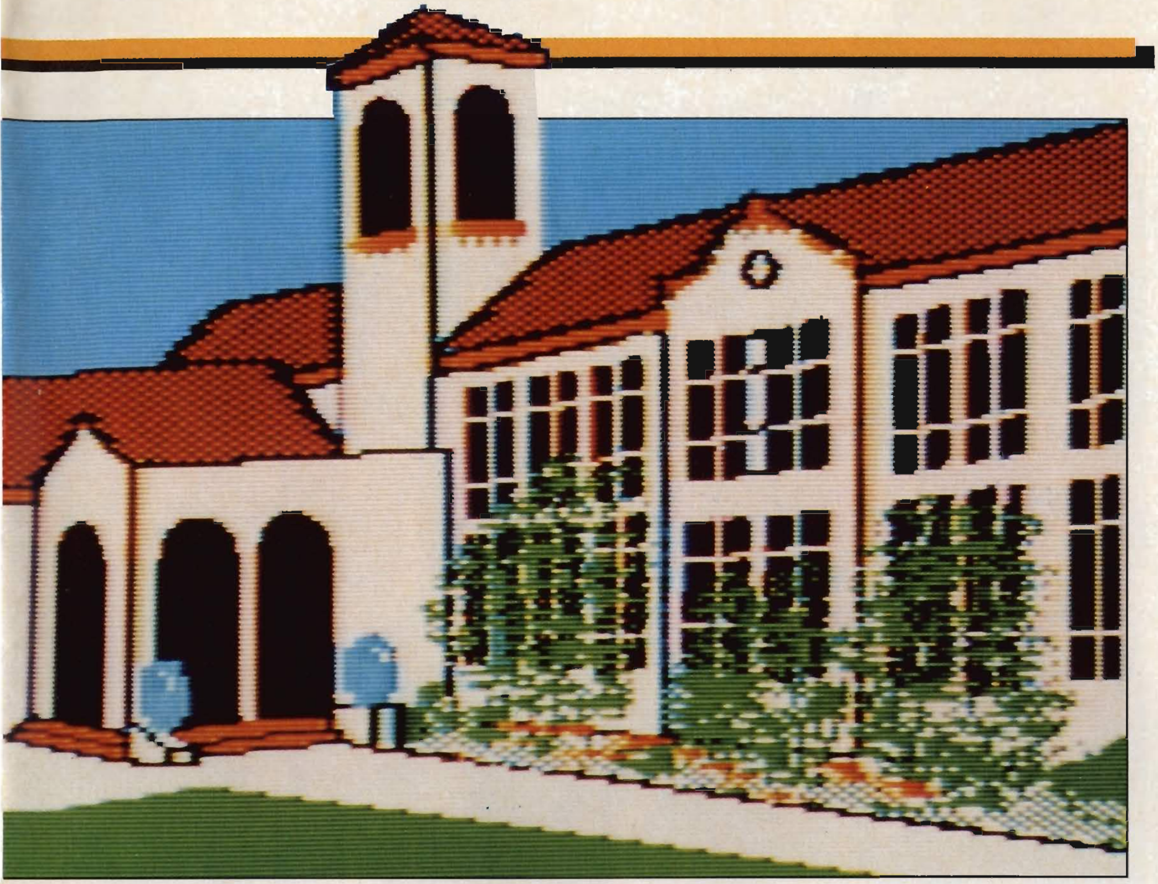

*The Mortensens can program in BASIC, but are also learning PASCAL—letting them add even more detail to their artwork.*

produce complicated images that show off what software can do.

A typical project for Mortensen graphics begins with a visit to the client. "We go over where they want everything to be in each picture," says Craig, "like when we did a Christmas demonstration program for Apple. They say, 'We want the Christmas tree here and the computer here.' Then we take the sketches home and do a basic outline on paper. We tape it on the computer graphics tablet so we can trace it onto the screen. The graphics tablet makes getting the picture onto the screen easy, and lets us concentrate on the artistic part. After we have the outline, we use the palette of colors that comes with the graphics tablet. There are eight basic colors that we can mix to make 120 shades on the screen," he explains. If touch-up work is necessary, it's done with the keyboard, Keith adds, because the keyboard allows them to make small, more precise changes.

Once the Mortensens begin work, they share the load. Craig may start to work on a picture and then let Keith finish it, or vice versa. "It would be really tough for one person to do all the work we do," says Craig. "But with the two of us, it's split in half and we get done faster." Adds Keith: "We think alike and have the same tastes, ideas and artistic ways."

Craig and Keith always go over all the graphics together before they deliver them to the customer. "That is when we give the project the final okay," says Keith.

The twins say they've recently learned the computer language PASCAL, and they intend to shift all their graphic work to it. PASCAL provides more power and flexibility than BASIC, they say. It will allow them to make up complicated graphics routines for any job, such as drawing parts of a vehicle separately and then letting the computer fit them all together. This should make their computer pictures even better than they already are.

The artwork Keith and Craig do for companies is automatically copyrighted by the company—but the twins haven't copyrighted the graphics they do for themselves. So,

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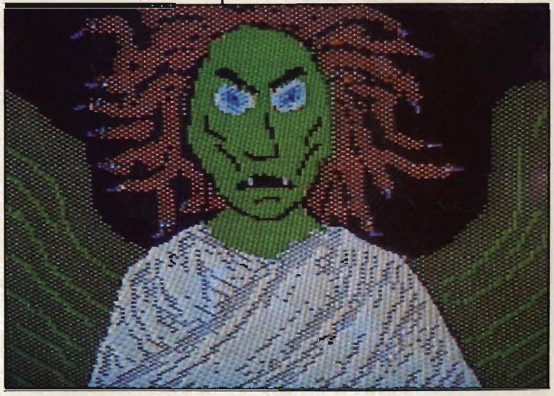

*Creating art with a computer keeps Craig and Keith busy, but they still find time for jokes and pranks.*

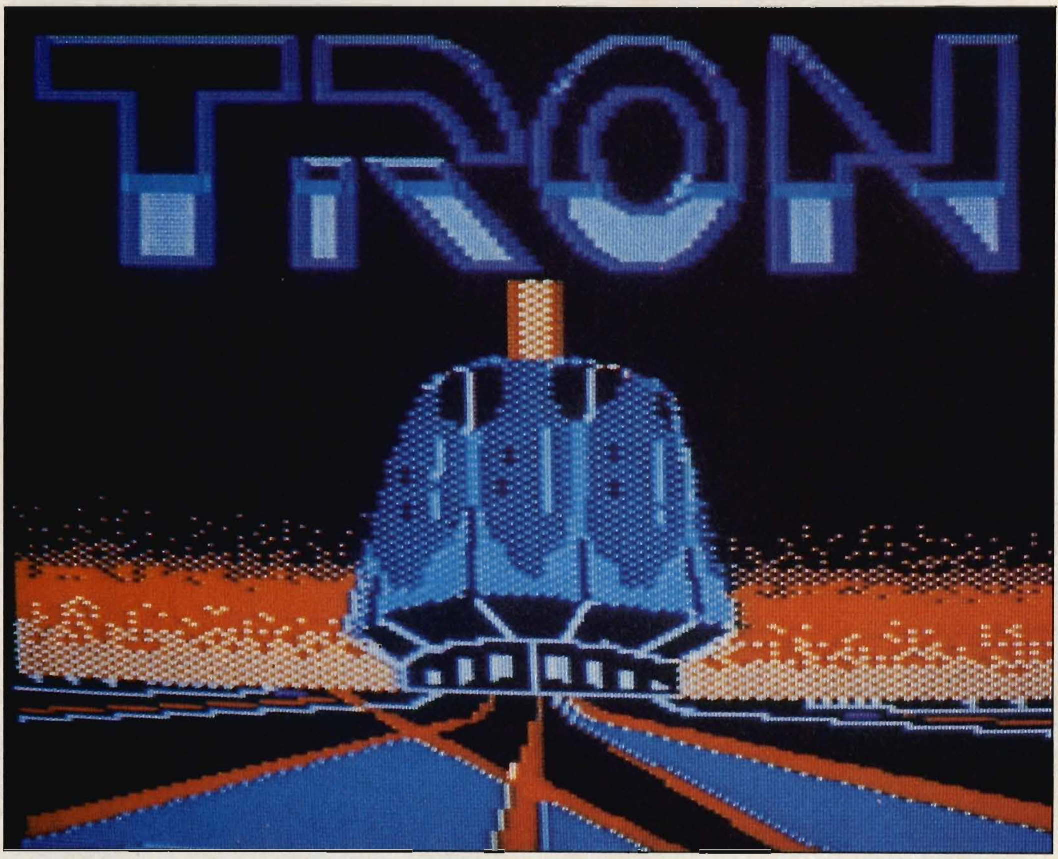

PHOTO © HEIDI WALDROP / INSPIRED BY THE DISNEY MOTION PICTURE *TRON*, USED BY PERMISSION

sometimes they have found their art copied illegally. When Keith went to the West Coast Computer Fair last spring to promote their company, he was shocked to see his and Craig's graphics being used to demonstrate a color printer. "It was spooky to see something you made up there and not know how they got it," says Keith. The twins still don't know how the company got their artwork, but they suspect it leaked out through a friend of a friend. "It's too expensive for us to copyright all our graphics when our company is so small," says Craig. "So from now on, we just have to watch who we give them to."

One other thing they've lost because they are so busy is the free time to simply draw. They rarely have a chance to do any artwork not connected with their computer work. "We'll occasionally do something like a drawing of our cat at school," says Craig. "But we concentrate pretty much on computer art now," he explains.

The twins will still make some time for practical jokes. They love pranks and have even included the computer in their schemes. "There are always new things to learn on computers," Craig says with a sly grin. "We figured out a way to control all of the computers in our school's lab from one computer through the master system. We set it up so that when the student starts to put in his or her password, it beeps—or messages come up on the screen. It's great," Craig chuckles. "The person thinks he's really messed up, but it's just that we programmed it that way. They get all nervous."

But most people are wise to the twins now. You see, they have established a reputation not only as great computer artists, but as jokesters as well. "We can always take out a little time for fun," says one of the chief executives of Mortensen Computer Graphics, with a straight face that hides a sly smile. ⊡

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*HEIDI WALDROP is a freelance writer who specializes in computers.*

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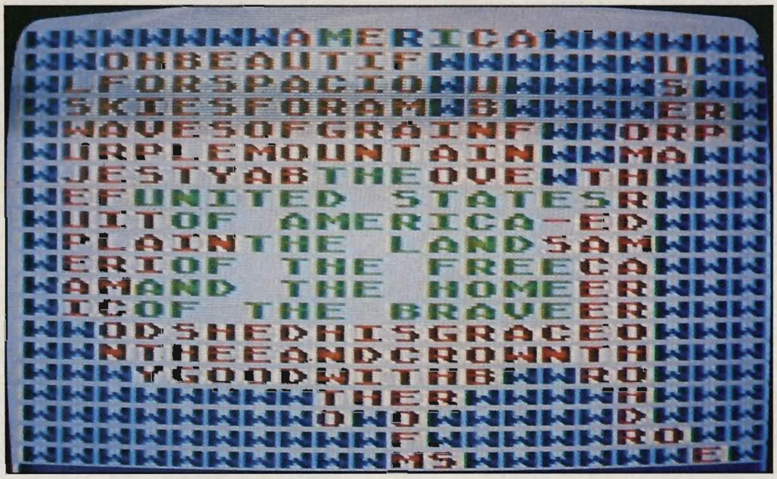
# COMPUTER GRAPHICS

### YOU DON'T HAVE TO BE AN ARTIST TO CREATE COMPUTER ART



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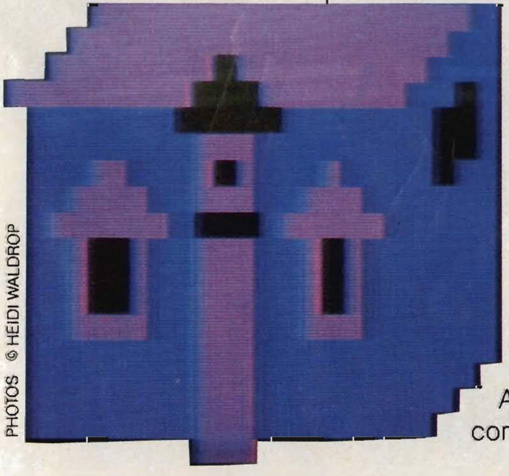
*Using words from the song "America the Beautiful" and their knowledge of programming, Misa and Audrey created a computer art map of the U.S.A.*

Most young people who work with computer graphics aren't professional whizzes like the Mortensen twins. But even those who are interested only in having fun working on the computer can make beautiful images with keyboard and screen.

Misa Oyama and Audrey Li, for instance, are new to computer artwork. Before last year, they had only *heard* about computers. Now they sit in their computer class at Kennedy Junior High School in Cupertino, California, making computer graphic haunted houses and whales.

"I'd never done anything on computers before I came to this school," says 12-year-old Audrey, who moved to Cupertino from Los Angeles two years ago. "But now I can make lots of great pictures." Misa has lived in Silicon Valley all of her life, but it wasn't until she and Audrey became partners in computer class that she started learning about computers. "It's more fun than I ever thought it would be," Misa says. "I thought computers were just boring numbers, but graphics are really fun."



PHOTOS © HEIDI WALDROP

One of Misa and Audrey's favorite projects was a school assignment. They were told to use letters in a creative way that also formed a message. Misa and Audrey decided to use the words to the song "America the Beautiful" to form a map of the United States.

"The first thing we did was draw the outline of the map on graph paper," explains Audrey. "Then we had to decide what letters we wanted where, and what color we wanted each letter to be." They put a letter from the song in each box of the graph paper that represented land, and put a blue W in every space where the water would be. Then they simply looked at the numbers on the top and sides of the graph paper for the locations ("coordinates") of each letter. They entered those numbers into the computer.

"Say we wanted an orange G in one box," says Audrey. "Then we told the computer that where these two numbers

# FOR FUN

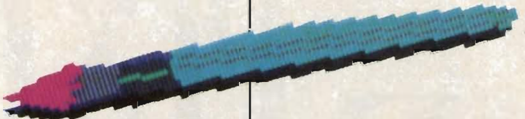


PHOTO © ED KASHI

**Audrey (left) and Misa can program in BASIC and are learning LOGO.**

intersect, we want an orange G. It was pretty easy after we learned how to do it, but it sure took a long time." The best part about that program, says Misa, is that you just type in the numbers and the computer does all the work.

Now that they have finished learning the fundamentals of how to do art in BASIC, the girls are trying their hands at animation in LOGO. "It's a little harder, but it's lots of fun," says Audrey. "We're trying to make two turtles collide. Then we have to make the aftereffects of the collision, like if they wiggle and change colors."

The girls don't plan to go into computers as a business. For Misa and Audrey, doing graphics is just what makes computers fun.

—*Heidi Waldrop*

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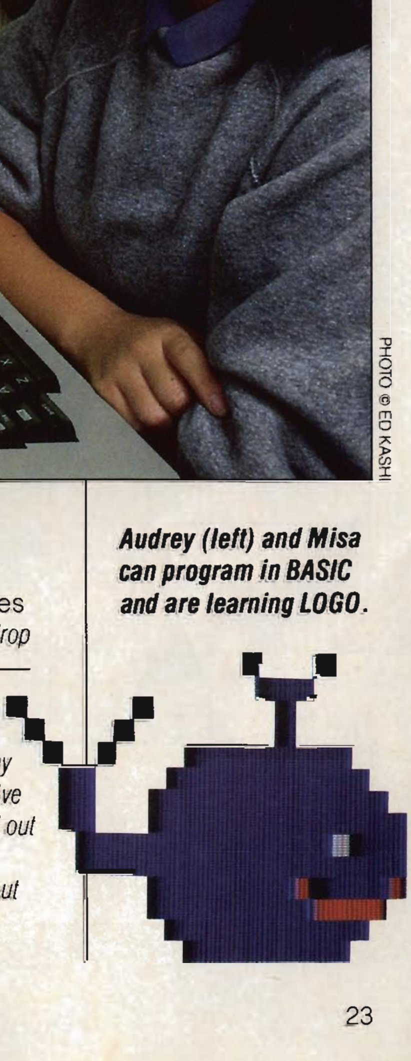
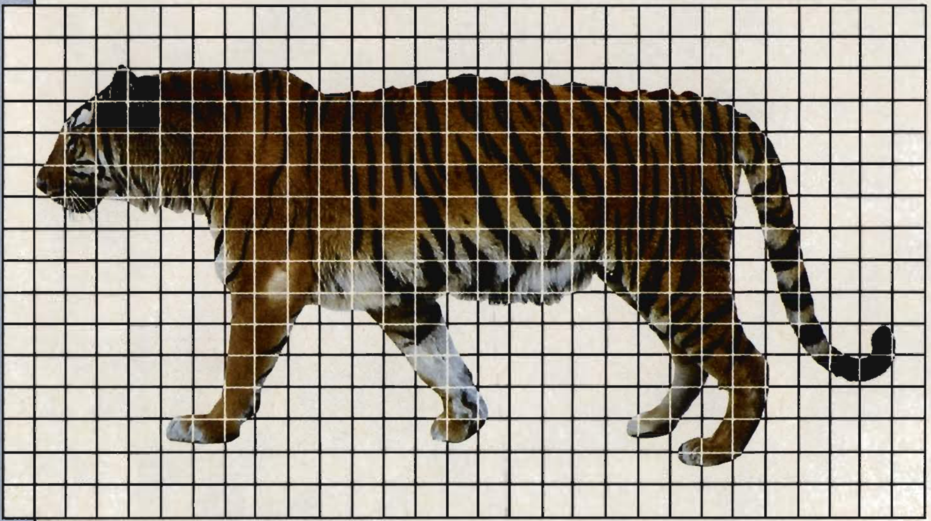
*Now that you've read about big-time graphics artists like Craig and Keith Mortensen, and beginner artists like Misa Oyama and Audrey Li, you may be ready to do a little computer art yourself. If you've got access to a computer, turn to page 27 and find out about some of the best graphics programming available. If you don't have access to a computer but want to learn a little more about how computer graphics are done, turn to page 24.*



# PIXEL PERFECT

Here's your chance to do a little computer-type art without using a computer. At the same time, you'll see why some computer graphics are more detailed than others.

When computer artists look at a screen, they are really looking at a series of squares. These squares, called pixels, are the building



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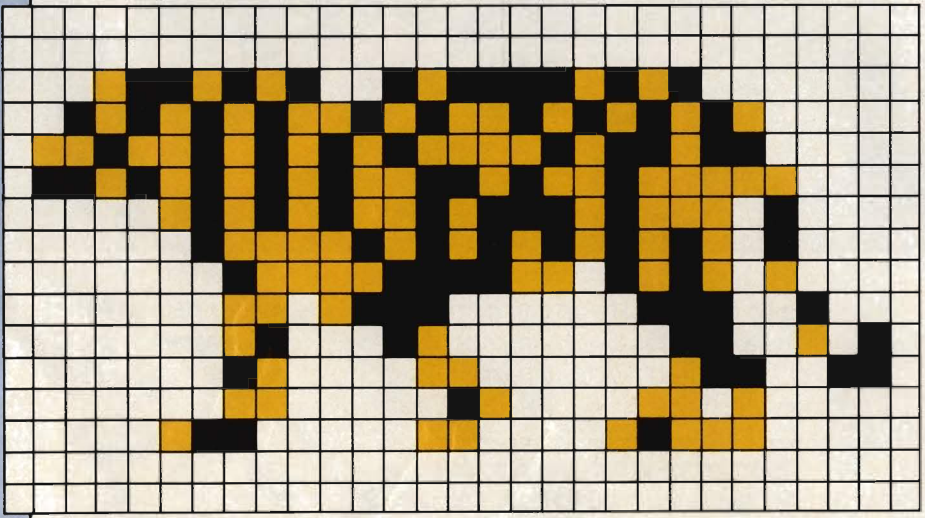


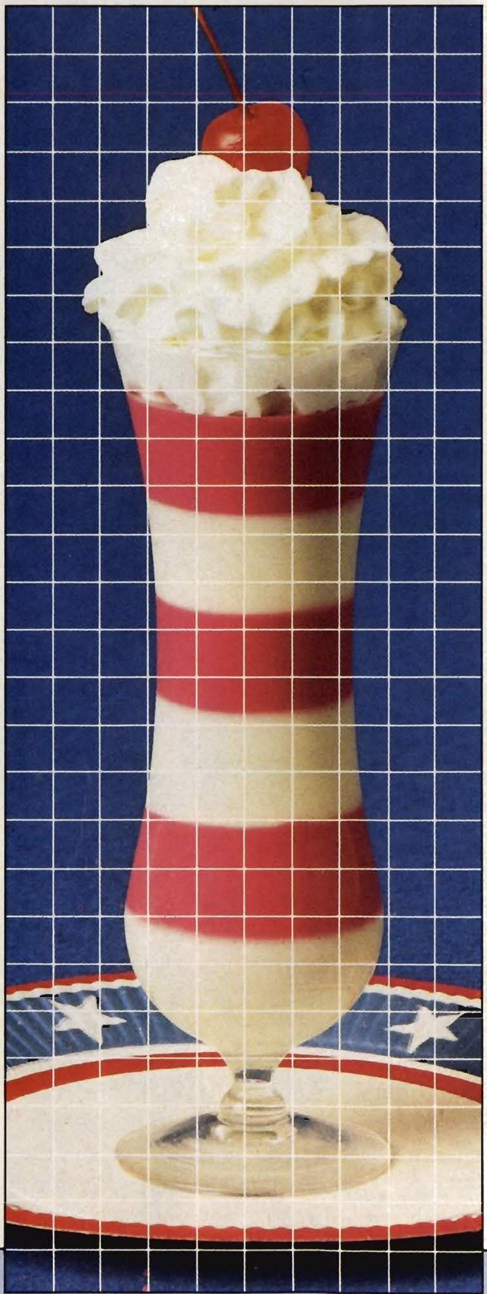


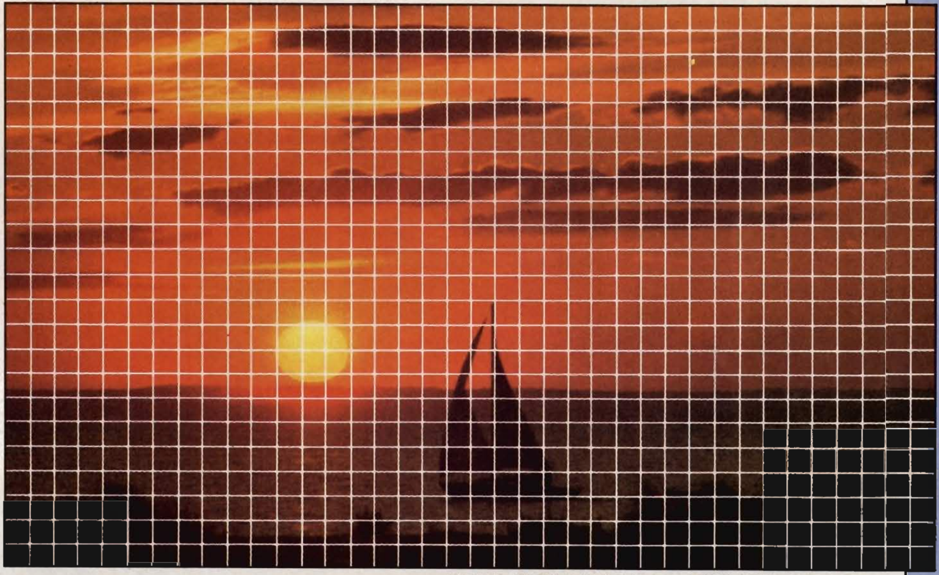
PHOTO © SIGRID OWEN/INTERNATIONAL STOCK PHOTOS

blocks for computer pictures. Color them in just the right way and you can make them look like anything.

But wait a second. If that's true, how come with some computer pictures it's so hard to know what you're looking at? The answer is something called *resolution*. Take a look at the empty squares below. Notice that the squares for the sunset scene are smaller than the ones for the ice cream parfait. The smaller the size of the squares (pixels) in a computer grid, the higher the resolution—and that means the picture you make will look more realistic.

Different computers have different degrees of resolution. For example, the Atari 1200XL fills a screen with 320 by 192 pixels (a total of over *61,000* pixels), while the Commodore VIC-20 has 178 x 184, or approximately 33,000 pixels. Other machines vary, with some higher and some lower.

But enough of all this talk. Grab a set of colored pencils or felt tipped markers and start filling in boxes. You've got lots of work to do!



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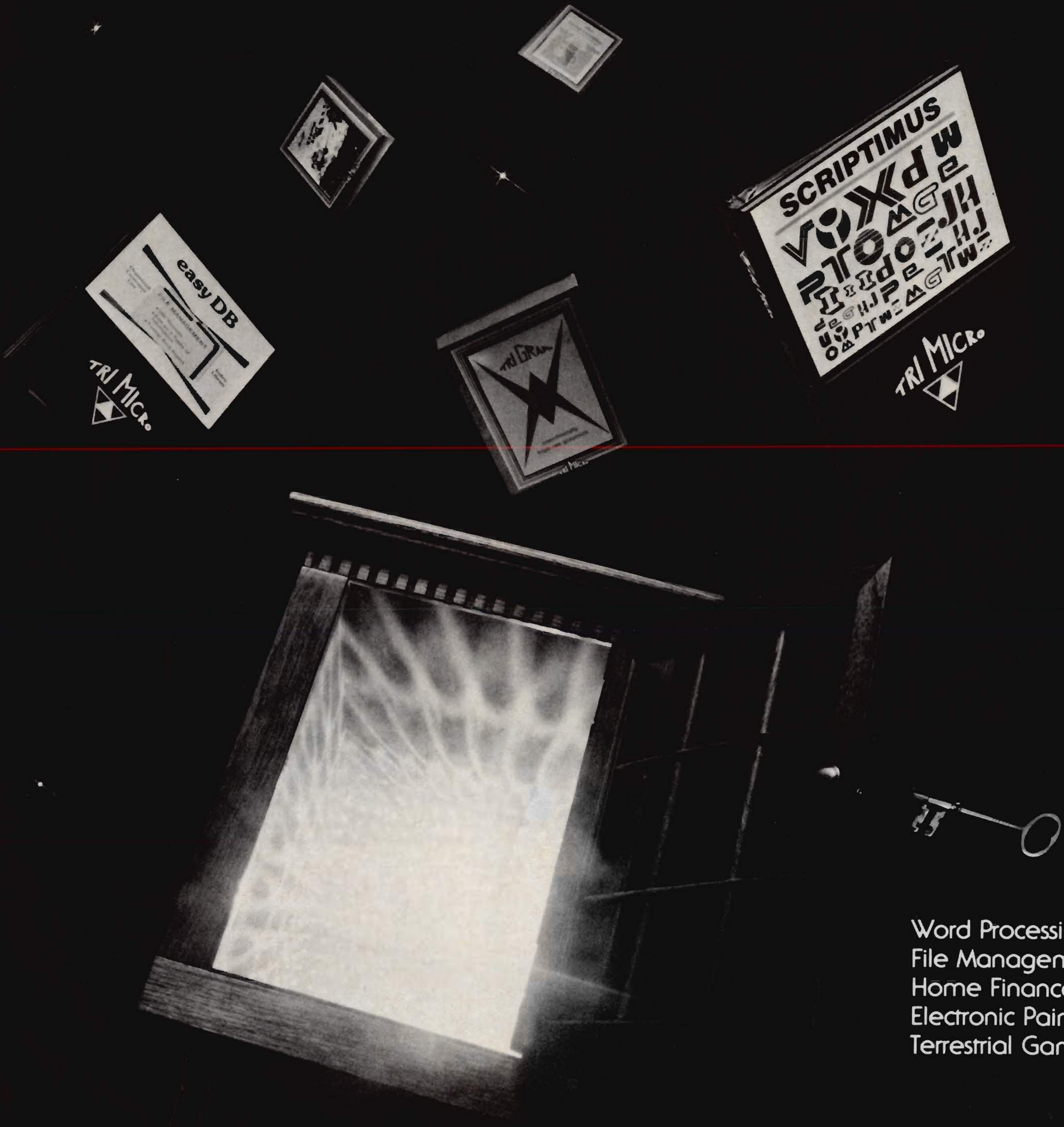
# THE MASTER KEY

unlocks the door to the Commodore 64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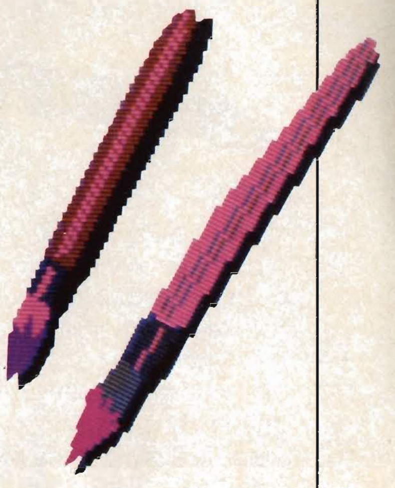


## CREATING COMPUTER ART AT HOME

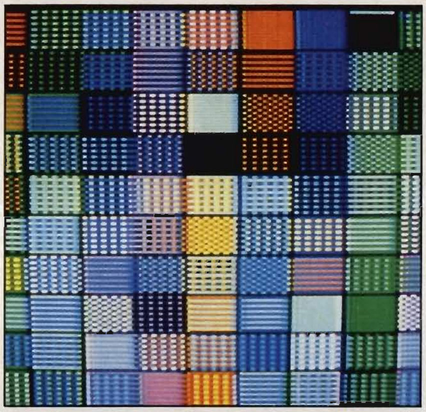
BY PATRICIA BERRY

Whether you're an old pro at computer graphics or a newcomer to the high-tech art form, there is plenty of good software for you and your computer. For starters, you need a personal computer, one or more disk drives (you'll need *more* than one if you want to save your designs), a color monitor or color TV, and a joystick or some paddles. You'll also need at least 32K RAM and lots of imagination.

We've noted programs for IBM, Commodore 64, Timex, TI, Apple, Atari and Radio Shack computers. We begin with starter programs and move up to more complex ones. Included are some of the more widely available, easy to use, or challenging graphics we found. (One note: the programs range in price from $15.95 to $59.95.)

### BEGINNERS' AIDS

**Delta Drawing.** LOGO is the computer language most often used for graphics programs. With *Delta Drawing* and an Apple II Plus, Atari, Commodore 64 or IBM-PC, you can learn LOGO as you work with the software. Delta Drawing allows you to draw basic shapes—circles, squares, triangles and cubes—without having to enter specific instructions. To do this, you use the LOGO drawing device, a turtle. You can also create more shapes and store them. When you want to recall a shape, the software lists the program in LOGO for that particular shape. This way, you get the fun of making a shape quickly, and learn LOGO in the process. The software, which also features several colors for filling in, comes with fast-start cards so you don't have to read the 80-page manual unless you have a problem. Spinnaker Software of Cambridge, MA, sells *Delta Drawing* for $59.95.



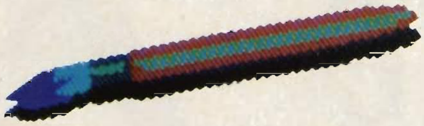
***A selection of colors leads off Penguin Software's* Graphics Magician.**

**Art for All Ages.** Another good program for the beginning designer is *Art for All Ages* for the Timex 2068. This software lets you start drawing with circles and squares. Later, you can expand to create pictures in free-hand using a joystick. *Art for All Ages* features eight colors and a "whoops" key that lets you erase a line you've just created. You can even alter a picture after you've saved it. There's also a command that lets you pluck out part of the picture and move it to somewhere else on the screen, or remove it altogether. *Art for All Ages* is currently available from Games to Learn By at PO Box 575, Williamsburg, MA, 01096, and costs $15.95. It should appear in computer stores soon.

### MORE ADVANCED

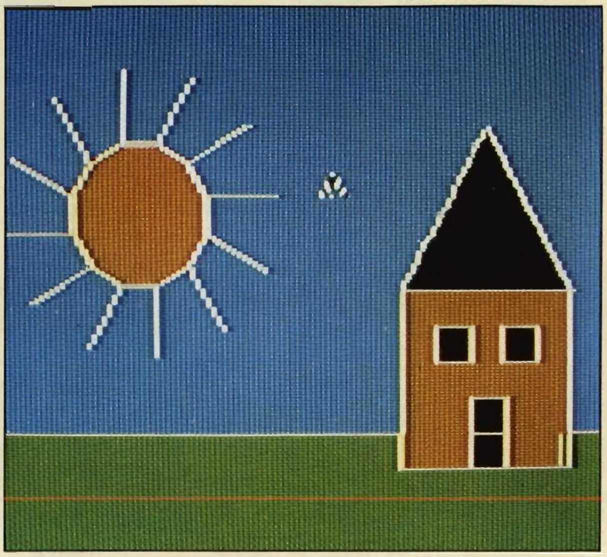
**Micro-Painter: The Electronic Coloring Book.** Another starter program, this works best on the Atari 800, although there are versions available for the Apple II and II Plus and TRS-80 Color computers. The disk includes eight ready-to-fill-in drawings for practice painting. By switching to the draw mode, you can sketch your own drawings. Your paintbrush, the cursor, looks

# COMPUTER



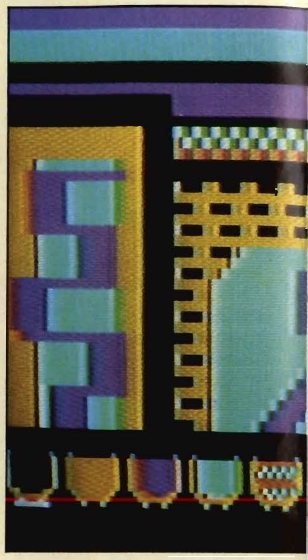
### DELTA DRAWING

***Learn Logo, the drawing language, while you design.***



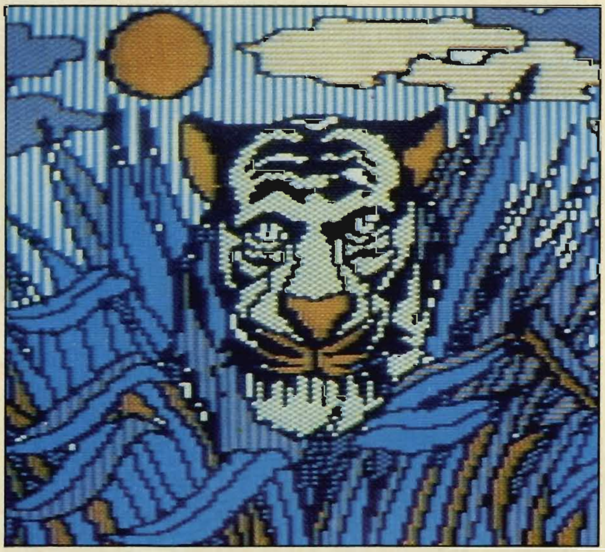
### PAINT

***Palette offers hundreds***



### MICRO-PAINTER

***You can color pre-drawn pictures or draw freestyle.***



### ART GALLERY

***Save your creations on***

like a flashing X when you draw and a plus sign when you paint.

There are four basic colors, but you can use them to create dozens of shades. You can also mix colors and fill in areas with stripes and checkerboards. Concentration on detail is easy with the zoom feature. DataSoft in Northridge, CA, makes *Micro-Painter* for the Apple and sells it for $34.95. The Radio Shack version is also $34.95.

***Paint.*** This graphics program for the Atari 800 has hundreds of color combinations to choose from. Like *Micro-Painter*, the software uses a cursor as a paintbrush. You can vary the size and speed of your brush strokes and make ribbon lines which appear to be three-dimensional. You can even make a perfect circle by telling the computer the size of the shape you want.

The program also has a zoom function and a neat feature called Art Show—essentially a timed slide-show-like presentation of up to 25 of your paintings. *Paint*, made by Reston Publishing in Virginia in cooperation with the Capitol Children's Museum, costs $39.95.

***Video Graphs.*** This graphics program for Texas Instruments' 99/4A computer has the artistic capabilities you'd expect, and more. *Video Graphs* lets you draw freehand, use geometric building blocks, and fill in with 14 different colors. You can operate the drawing cursor with the keyboard or a joystick, and save designs with a cassette recorder.

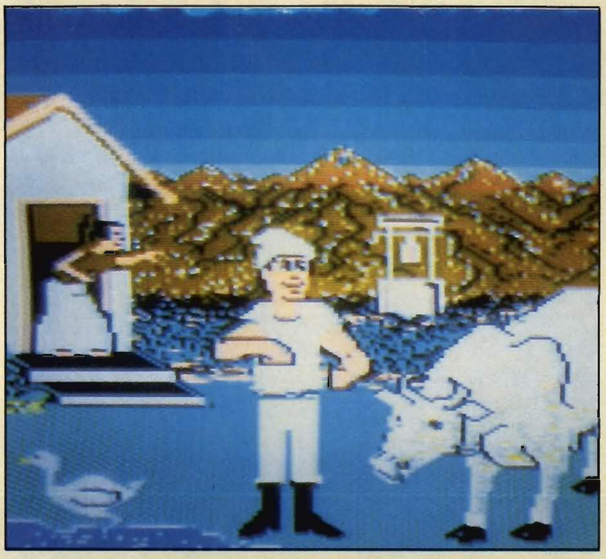
The *Video Graphs* program also includes "Color Life," a colorful simulation game. Bright and animated graphics highlight this cell life demonstration program. The computer monitor displays cell birth, growth, and division patterns over several generations. It may sound academic, but the graphics are fun to watch in action—and you can change the patterns by making changes in the initial data. The *Video Graphs* cassette for TI computers sells for $19.95.

***Art Gallery.*** With the TRS-80 color computer and the *Art Gallery* cassette, you draw and paint color graphics and save them on a CTR-80A cassette recorder. The program comes with an overlay you place on the keyboard. The overlay is a plastic sheet which shows which keys to press for the function you want. The program includes sample drawings you can practice with before you go solo. A joystick is not necessary (although it's recommended). You need 32K to use the program but may want to add

***of color combinations.***

## FUN WITH ART

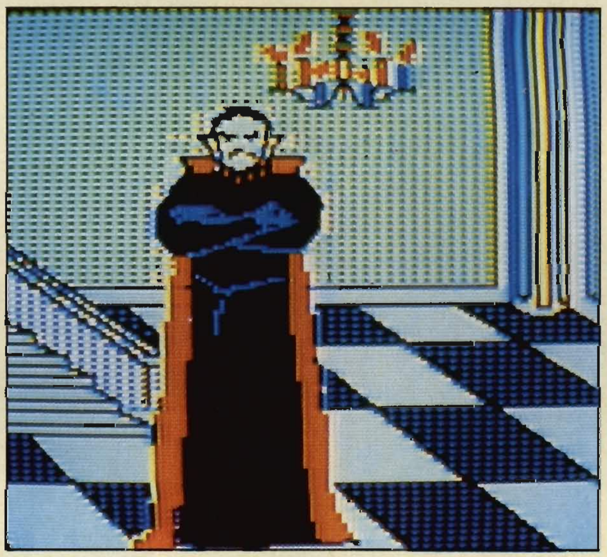
***Transfer blocks of your design across the screen.***



***a cassette recorder.***

## GRAPHICS MAGICIAN

***Animation feature lets you "add color" to programs.***



extra memory in order to get its full benefits. *Art Gallery* is available from Radio Shack for $39.95.

***Fun with Art.*** Originally designed for beginners, *Fun With Art* is now being marketed to all age groups and abilities. The software operates on Commodore 64 and Atari computers. It gives the artist 128 colors to choose from—that is, 16 colors in eight shades each. A special block transfer mode of the program, which comes in disk and cartridge forms, allows you to move a chunk of your picture from one portion of the screen to another. More advanced programmers may want to incorporate their drawings with other programs which they can do easily with the programmers' cues at the back of the instruction manual. *Fun With Art*, produced by Epyx of Sunnyvale, CA, sells for around $40.00.

# GRAPHICS

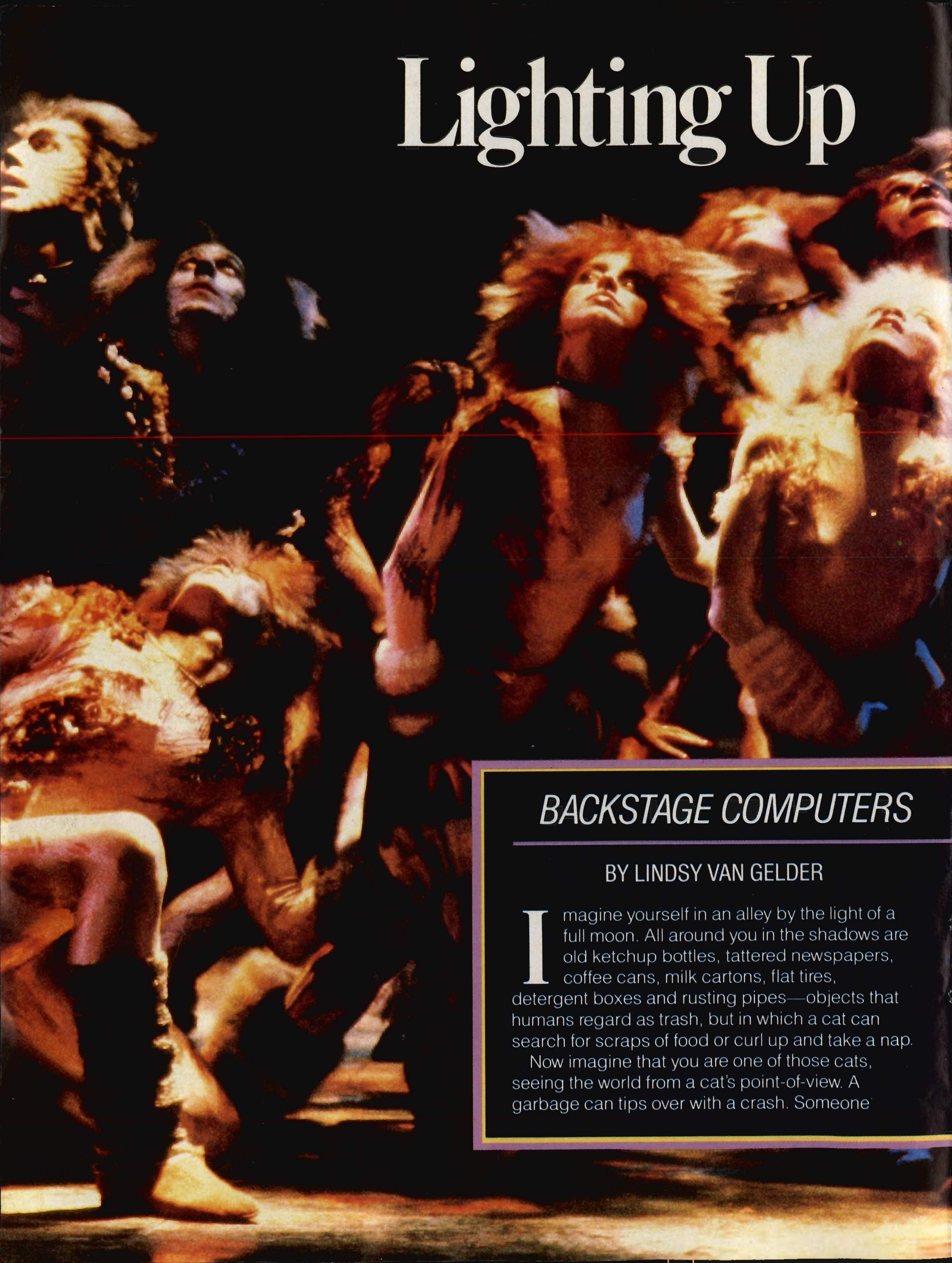
***Graphics Magician.*** Designed for more sophisticated users of Apple, Atari, IBM PC and Commodore computers, this is an updated version of Penguin's *Graphics Magician*. It is faster, easier to use, and has more options than the older version. With about 100 colors, the software also has animation capability. You can design animated screens and add them to your own programs, whether they're in BASIC or machine language. Penguin will replace the old *Graphics Magician* if you send your original disk, manual and $15.00 to Penguin Software, 830 Fourth Avenue, PO Box 311, Geneva, IL, 60134. The new version, now in a box, costs $59.95.

## TOUCHPAD POWER

No look at computer graphics would be complete without a mention of graphics tablets and touchpad peripherals. These control devices plug into your computer and let you draw on the screen by moving your finger or a special pen around the pad surface. Graphics tablets only work as drawing devices. Touchpads, though, let you draw and do much more. The two most flexible touchpads are Koala Technology's Koalapad and Chalkboard, Inc.'s PowerPad. Both come in Apple, Atari, Commodore and IBM computer-compatible versions, and cost between $99 and $150. For more about touchpads, see "State of the Art" in the Dec. '83/Jan. '84 issue of ENTER.

*PATRICIA BERRY is associate editor of ENTER.*

# Lighting Up



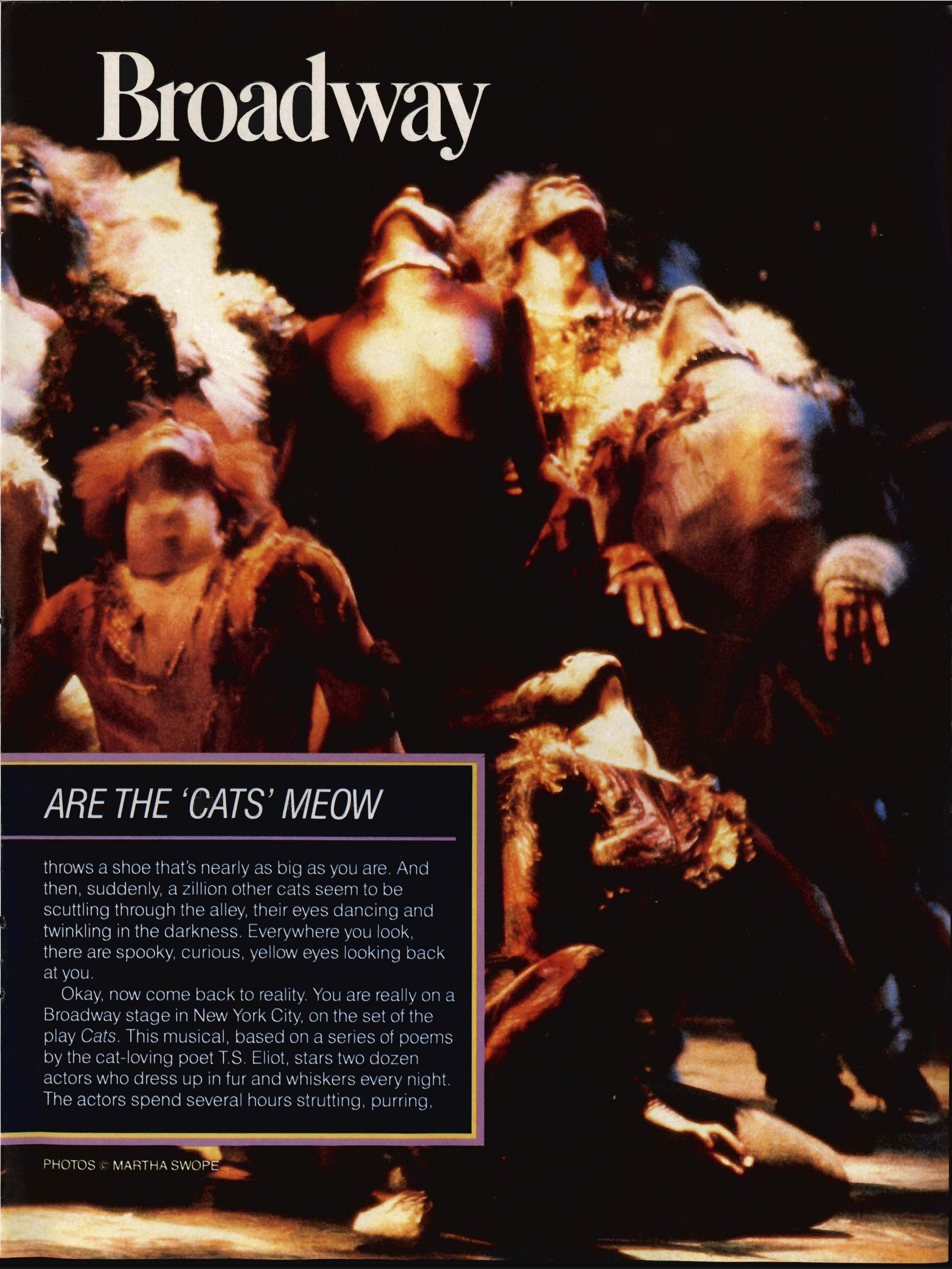
## BACKSTAGE COMPUTERS

### BY LINDSY VAN GELDER

Imagine yourself in an alley by the light of a full moon. All around you in the shadows are old ketchup bottles, tattered newspapers, coffee cans, milk cartons, flat tires, detergent boxes and rusting pipes—objects that humans regard as trash, but in which a cat can search for scraps of food or curl up and take a nap.

Now imagine that you are one of those cats, seeing the world from a cat's point-of-view. A garbage can tips over with a crash. Someone

# Broadway



## ARE THE 'CATS' MEOW

throws a shoe that's nearly as big as you are. And then, suddenly, a zillion other cats seem to be scuttling through the alley, their eyes dancing and twinkling in the darkness. Everywhere you look, there are spooky, curious, yellow eyes looking back at you.

Okay, now come back to reality. You are really on a Broadway stage in New York City, on the set of the play *Cats*. This musical, based on a series of poems by the cat-loving poet T.S. Eliot, stars two dozen actors who dress up in fur and whiskers every night. The actors spend several hours strutting, purring,

PHOTOS © MARTHA SWOPE

prancing, preening, yowling and otherwise transforming themselves into alleycats, and dazzle the audience with their prowess. But there are two other stars of *Cats* that the audience never sees—and who couldn't catch a mouse to save themselves. Their names are simply "A" and "B." They are the twin computers who control every action of the 15,000 lights in the theater—including the 1,000 pairs of electronic cats' eyes.

## ELECTRONIC STAGE HANDS

*Cats* is the flashiest, but not the first, show to use computerized lighting. "Plays used to be dependent on manpower and muscle for lighting changes," says award-winning lighting director Tharon Musser. "[With computers], it's like night and day compared to several years ago." Musser has used computerized lighting boards in a number of musicals, including *A Chorus Line, Dreamgirls, Brighton Beach Memoirs,* and *42nd Street.*

> Computers are *also lighting up hit shows like* A Chorus Line *and* Dreamgirls.

In *Cats,* the computer-run lights extend the feline alley beyond the stage to the theater's walls, aisles —even its ceiling! And this is only the beginning. In a few years, as stage shows find new applications for computers, theaters will be transformed in even more dazzling ways.

## CATWALK COMPUTERS

The *Cats* computers—"A" and "B"—are operated by 27-year-old master electrician Jim Maloney Jr. Jim, whose father and grandfather were both theatrical electricians, works on a tiny platform above the stage. This platform is called a *catwalk*—not because of the subject of the play, but because it's so narrow and high that you practically need nine lives to climb it. During every performance of *Cats,* Jim can be found on this catwalk operating "A" and "B."

"They do all the work, and I know it," he jokes, "so I pamper them. I turn them off when they don't need to be on, just to give them a rest. I even kiss them goodnight."

If you ever saw Jim at work—typing on both keyboard consoles at once like a maestro in concert—you'd know he was being too modest about his role. Humans are very much needed to run these computers. In Jim's catwalk cockpit, along with the two computers with built-in screens, there are two TV monitors. One monitor gives Jim a general view of the stage, while the other is focused on the orchestra conductor. Because every performance is slightly different, the computer can't just be turned on and put through its paces when the curtain goes up. That could cause trouble, if, for example, an actor was a litttle bit slow to move to center stage. The computer might end up sending out a dazzling spotlight—with nobody in it. That's where Jim's job comes in. He follows the progress of the play on the monitor, and presses keys that make the pre-programmed lighting effects happen at just the right time.

The computers used in *Cats* are "dedicated" machines called Kliegl

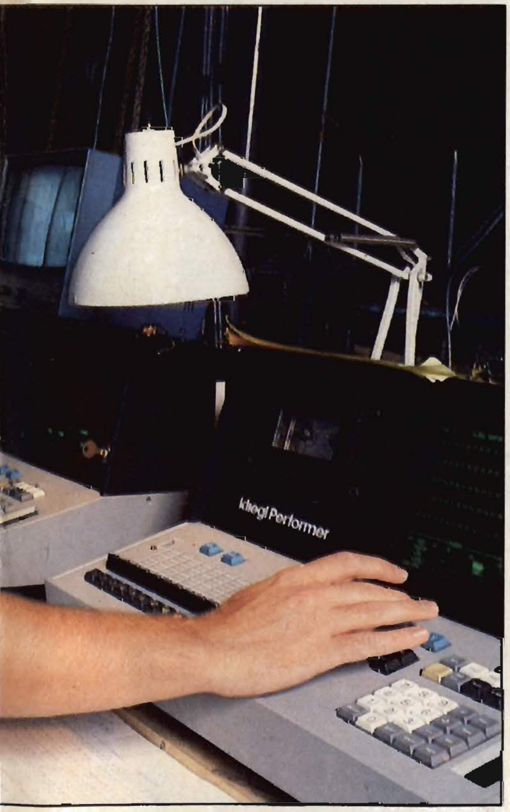
PHOTO © PETER J. KAPLAN

***Jim Maloney works* Cats' *computer***

The cats' eyes flashing around the stage are really computer-controlled lights.

Performer IIs. "Dedicated" means that they're specially designed for doing one particular job—handling the lighting duties. You can't play *Ms. Pac-Man* on them. These computers don't have regular typewriter keyboards. Instead, they have a special-instruction keyboard and levers.

The program that reads the instructions and moves the levers for each of the show's two acts is contained on a tape cassette. Turn on the machines and you see rows of numbers on their screens. These numbers represent specific lights, or groups of lights, spread around the Winter Garden Theater. The lights include those cats' eyes, plus footlights, spotlights, dimmers, strobes, and festoons of Christmas-tree bulbs that wind all over the walls. When Jim punches in a pre-coded command—usually a number—the program knows which lights to light, at what degree of brightness, and for how long. The cats' eye sequence, for instance, is programmed as a "chase loop"—with the lights set to blink in sequence, giving the impression that the cats are running around the stage. In actual fact, it's the *light* that's running around the stage. If you're looking at the screen when the program is running, you see the numbers flashing and flipping to indicate what's happening on stage.



***lighting from a catwalk over the stage.***

## MOVING THE SHOW

Lighting effects like the cats' eye sequence would be virtually impossible without a computer. A human couldn't turn the lights on and off fast enough. The new technology gives those who design and stage a play new opportunities.

"You wouldn't believe how primitive theater lighting was before the computer came in," says Rick Belzer, the 28-year-old lighting design assistant for *Cats*. Just a few years ago, says Rick, "You'd have a bunch of guys pulling on strings and kicking things with their knees at the same time. You'd have to memorize all these things like, 'Push this, shove that, and then count to three and push again.' And then at three o'clock in the afternoon, the director would decide to do the scene differently, and you'd have to memorize a whole new set of cues. Of course, a lot of those cues got blown during the performance."

With a computer, Rick adds, "you can have some peace of mind. If the director gets temperamental at the last minute... Hey, no problem. All you have to do is edit the program."

Rick, who began working with stage lighting in a community playhouse when he was 14, and who has been learning about computers over the past few years, remembers that the new technology was not popular when it first appeared on Broadway.

"The first successful show to use computers was *A Chorus Line* in 1976," Rick recalls. "People were a little bit afraid of the technology... You'd hear of cases where the guy who was running the show hated the computer, and he'd call up the lighting designer a half an hour before the curtain and scream that the machine wasn't working. Then it turned out that he'd

forgotten to turn the switch on."

Of course, there can be some real disasters that could only happen with a computer. Dirty tape heads, for example, can make the machine as finicky as...well, a cat. To prevent this, *Cats'* technician Jim Maloney cleans his tape heads four times a week, and replaces his program tapes regularly. "It's pretty scary to look at the screen and suddenly, instead of seeing a diagram of lights, you're seeing a lot of random letters like p's and q's," he says. If the worst happened, and the whole system shut down completely during an actual performance, Jim says he could do the lights by hand—and feet and knees and elbows—but at the end of the night, he'd probably resemble a bowl of spaghetti.

So far, the worst has never happened in a computer-lit show. But human errors have caused some theater computers to go haywire. Jim once went to Mexico City to set up the computerized lighting for a production of *Evita*. The day after he came back to New York, he got a frantic phone call in the middle of the night asking him to fly back down immediately. "It seems that the stage manager had been playing with the computer and, by mistake, completely erased the tape," says Jim. Rick Belzer *always* writes all his lighting cues down on paper and sticks them somewhere in case of an emergency. And that emergency usually happens at least once. "I have yet to do a show where someone doesn't erase the master tape," he cheerfully admits. "I've even seen people erase the master tape *and* the back-up tape."

*If the computer crashed, Jim could do lights by hand—and knees and elbows.*

**Cats'** ***computers help, but actors and stagehands still hold center stage.***

## ON WITH THE SHOW

But even when Broadway's computers are running perfectly, they don't yet handle all special effects. *Cats*, for instance, features an astounding scene where an old cat named Grizabella ascends to feline heaven. The scene has Grizabella mounting an enormous spare tire that rises from the alley (on a hydraulic lift). The tire rises through a cloud of mist (dry ice pumped up from under the stage by technicians in *Star Wars*-like fog-proof helmets). Then, the ceiling opens and a magic staircase descends to meet Grizabella's tire-chariot in mid-air. In this entire scene, only the lighting beneath the tire is controlled by computer. Teams of stage technicians must still scramble around pulling levers to create the other special effects.

In the future, though, Jim Maloney predicts computers will help create special effects that make the *Cats* effects seem simple. In addition to more elaborate lighting designs, computers will probably be used to move scenery, control sound effects and perhaps even to project deceptively real visual images onto the stage. Before long, Jim says, entire Broadway shows will be run with special effects that only a computer can operate.

Just the thought of it is enough to make you purr.

*LINDSY VAN GELDER writes about computers for a number of national magazines.*

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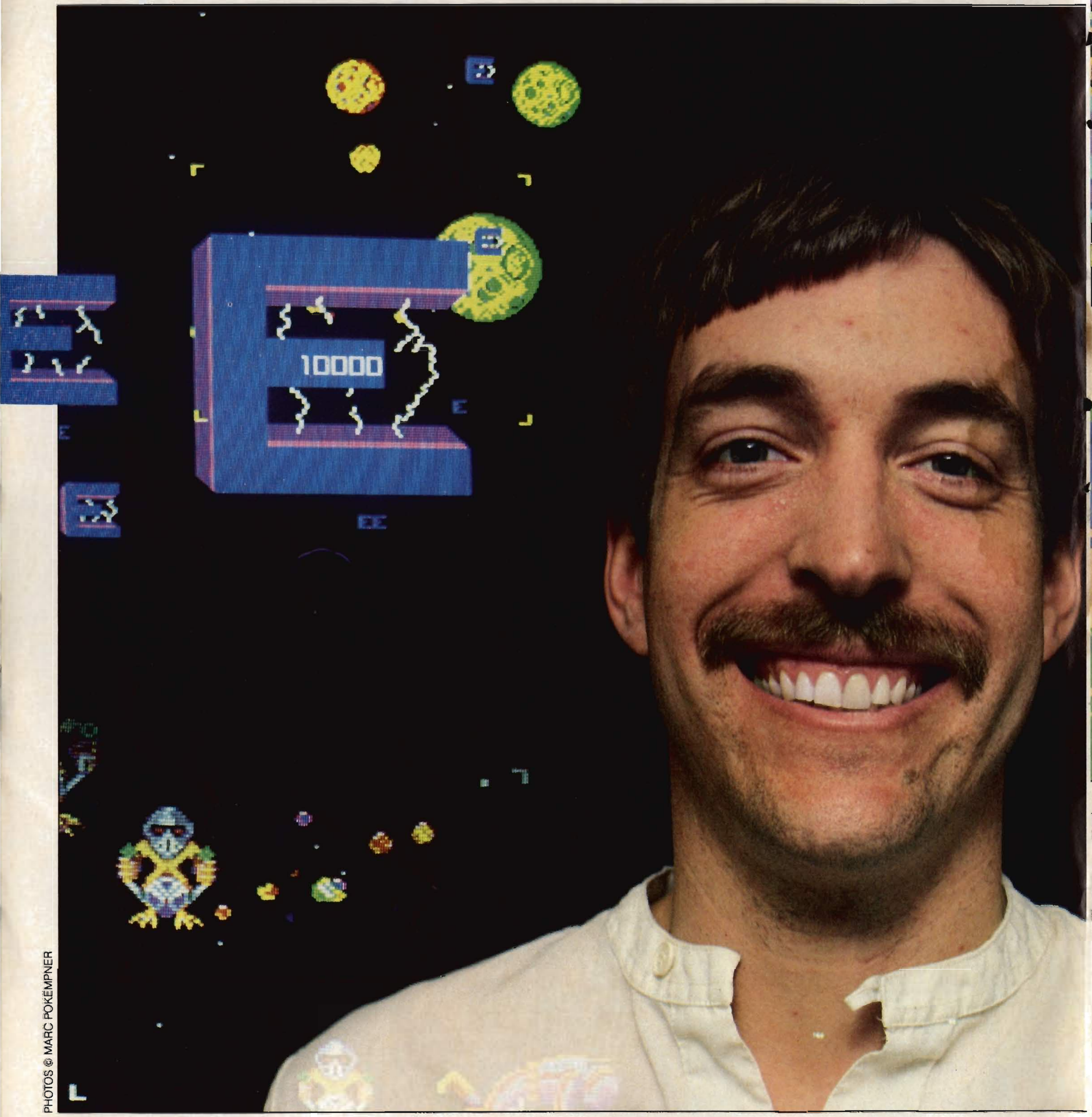
# THE GAME



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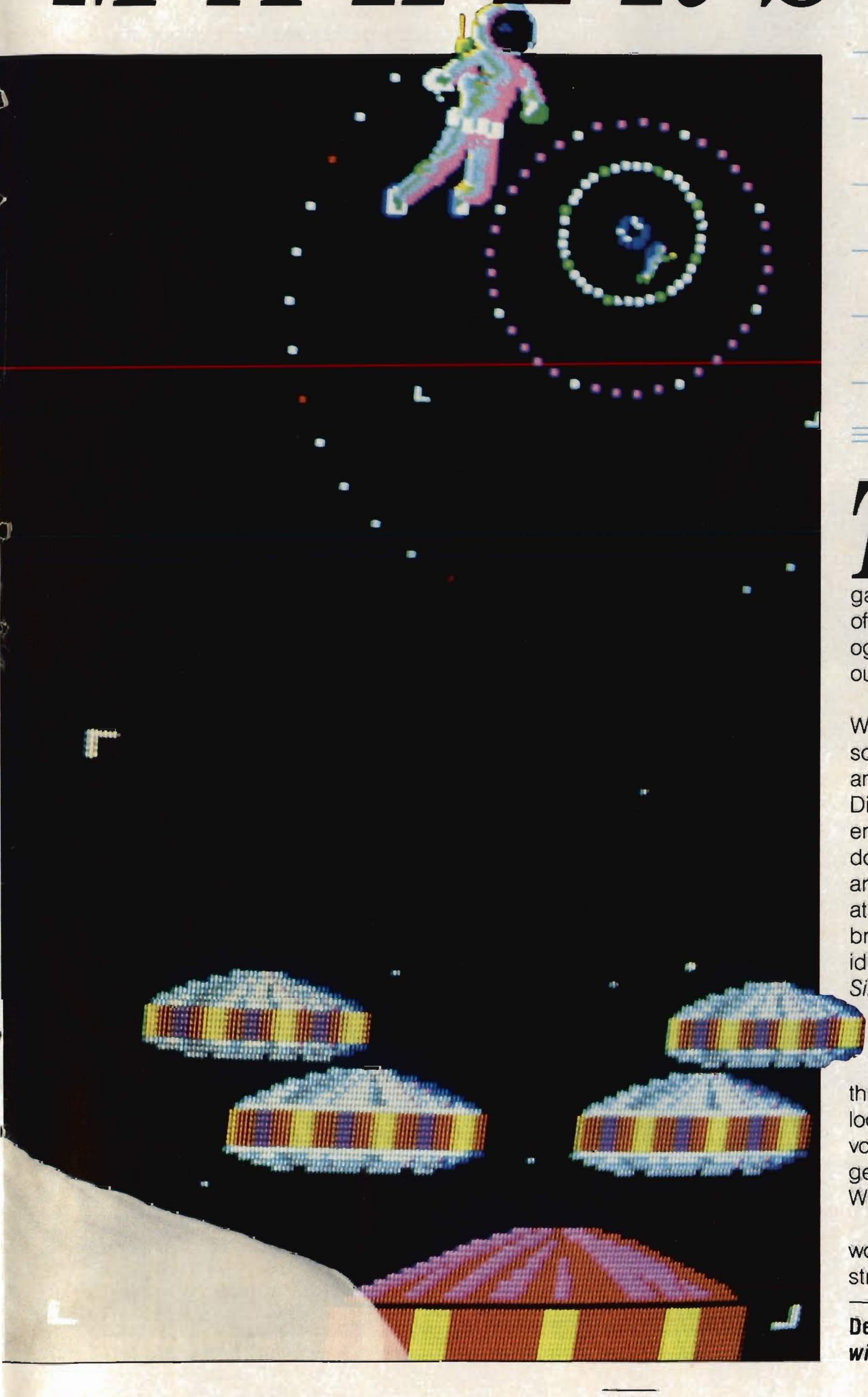
# MAKERS



## IT TAKES TEAMWORK TO GET FROM IDEA TO ARCADE

### BY JIM LEWIS

They wanted the ultimate bad guy, the kind of villain who could eat Darth Vader for breakfast. They wanted a game that would tell a story, show off the best new arcade technology, and be more than just another outer-space-shoot-'em-up thriller.

But in November 1981, all Williams Electronics, Inc. had were some awesome-looking planets and spaceships created by Sam Dicker, one of their game designers. So one November day about a dozen top people from this major arcade game company gathered at a downtown Chicago hotel to brainstorm about a new idea—an idea that would become the game *Sinistar.*

With planets and spaceships as a starting point, they talked about all parts of the game. What would the fearsome villain, the Sinistar, look like? What strange sounds and voices would be heard? What dangers would there be in defeat? What rewards for victory?

Ideas flew around the room. This would be a game of speed *and* strategy. A player would have to do

**Defender *co-inventor Gene Jarvis with some of his arcade creations.***

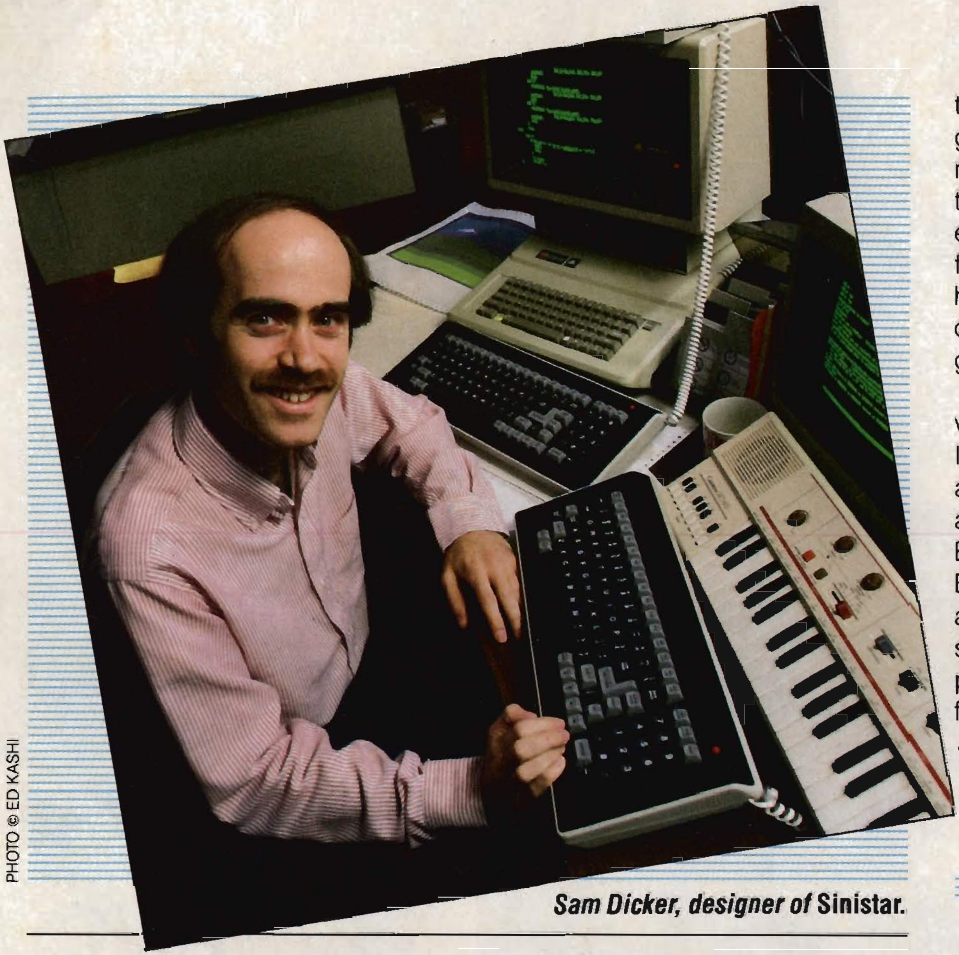


PHOTO © ED KASHI

***Sam Dicker, designer of*** **Sinistar.**

more than blast a laser cannon to survive. The game would feature a state-of-the-art joystick controller and the eerie voice of the Sinistar.

"When we came out of that meeting," recalls John Newcomer, director of game design at Williams, "we had a very definite sense of the game we wanted to create."

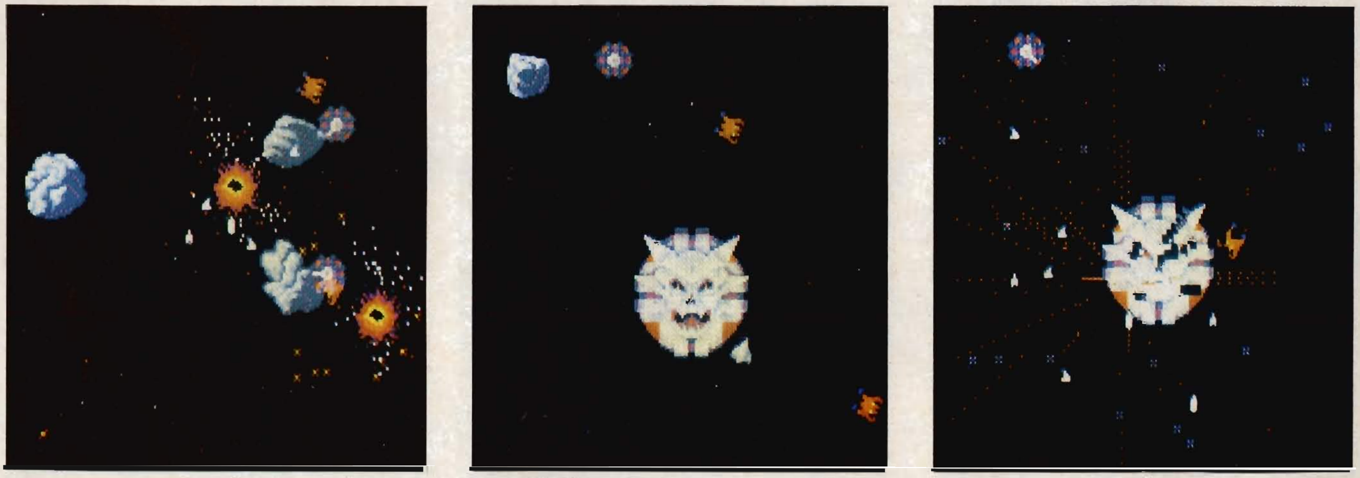
## THE IMPORTANCE OF TEAMWORK

But creating an arcade game these days takes more than just good ideas, exciting images and a meeting of minds. With *Sinistar,* a team of designers, programmers, engineers and artists had to work for many months and overcome hundreds of technical and creative obstacles in order to bring their game from idea to arcade.

This complexity is a new development in arcade game making. In 1980, designers Eugene Jarvis and Sam Dicker worked virtually alone to create *Defender,* Williams Electronics' very first video game. But, says Gene Jarvis, those days are over. "Now the games are so sophisticated, with so much happening at once, that it's too much for any one person to do alone." Jarvis, who helped create *Robotron 2084* and *Blaster,* now works with VidKidz game design company.

## STAGE ONE: THE STORYBOARD

At Williams, an idea that's been approved for development is assigned to a design coordinator and a team of graphic artists and hardware and software specialists. During the first few weeks, known as the *storyboard stage,* the designer and team turn the early



***It took a team of programmers, artists and engineers more than a year to bring*** **Sinistar** ***to life.***

brainstorming ideas into a detailed game outline.

This outline is "a coherent write-up of the game rules, its cast of characters, what happens as the game progresses, and what special hardware and other things might be needed," explains John Newcomer. "We hash things out, figure out what's feasible and begin to assign specific tasks," says Newcomer, who was design coordinator for both *Sinistar* and another Williams arcade hit, *Joust*.

The storyboard stage usually takes only a few weeks, but the next step—the initial design stage—can last from five months to a year.

## STAGE TWO: PIXEL 'PAINTING'

As design begins, the graphic artists make sketches of game characters and background settings. They do their "painting" on a specially programmed video game device nicknamed "Picasso." Using a joystick, the artists move different colors into place, pixel by pixel, on a video screen. The "Picasso" system allows the artists to see—immediately—what their creation will look like in the game. And, because "Picasso" is relatively easy to use, a game artist does not have to be a sophisticated programmer. "That enables us to have a good artist who is not necessarily a computer genius do wonderful things on the computer," explains Newcomer.

While the artists are creating the graphics, hardware specialists are translating the game outline into technical terms. They must determine how much memory the game will need and what arrangement of microchips and computer components will do the best job.

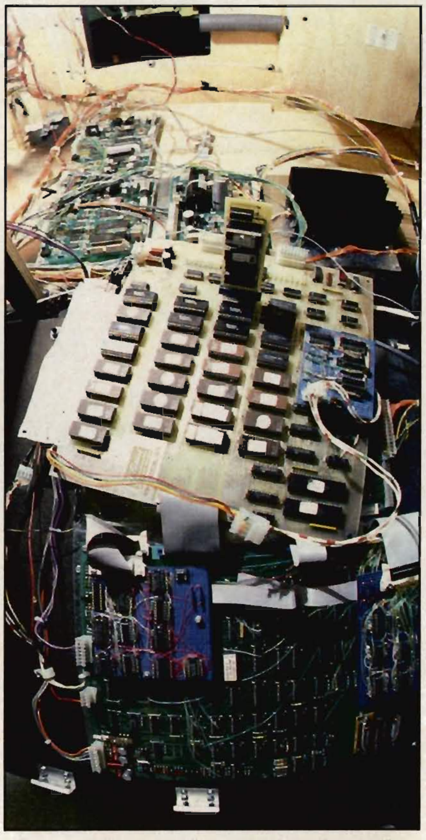
For example, when the Sinistar appears and announces, "Beware, I live!" the game must be able to produce the correct image and sound simultaneously. Careful hardware design enables the game to call up this information from its computer memory at just the right moment.

## STAGE THREE: PROGRAMMING

But microchips and pictures alone do not bring players into arcades. Action on the screen is what makes a game exciting, and that action is the masterwork of software design specialists.

From the brilliant explosions in *Sinistar* to the bubbling lava in *Joust*, action happens in an arcade game only when a program is written to make it happen. For *Sinistar*, program coordinator Noah Falstein assigned a section of the game to each programmer. One programmer worked on game sounds and another on character animation. A third programmer added explosions and other effects.

***New games are tested in arcades. Unsuspecting players are watched by a note-taking design team.***



***An arcade game's computer innards.***

All of these programs are written in *assembly language*. This is a method of communicating directly with computers through the binary code of zeroes and ones. It is a very slow, but extremely precise, way to give computers instructions. The game programmers work on terminals connected to a Vax 11-750 mainframe computer. The programs for all the parts of the game are stored in the Vax. A chief software designer links them together by writing the background program. This program is the very heart of the game. It does not create action, but makes action possible by coordinating all other programs and telling the computer the rules of the game.

Two final programs must also be written. The first is a "diagnostic" program that constantly checks game hardware and software to make certain everything operates properly. The second is an "attract mode" program that determines what appears on the screen when the game is *not* being played—including the game's name, an ac-

V. Vampires
II Robot Grid
I. Planetoids
E

**The first step: game sketches.**

tion sequence, hints on how to win, and a list of high scorers. When all the programs are finished, they are downloaded from the Vax into programmable read-only-memory chips (PROMS). These chips store the programs inside the machines.

**Designers use the "Picasso" system to move colors and create graphics.**

As a final design step, artists create striking scenes for the sides of the game machine, and a cabinet is built to hold the newly created game.

## STAGE FOUR: TESTING AND TWEAKING

The design process, with its many steps, takes months. When it is completed, the game is tested. An arcade is chosen and the new game is placed there among other, older games. For a few days, design team members watch while unsuspecting arcaders play the new creation.

"We get to see in that first concept test whether or not people like the idea of the game," explains Paul Dussault, Williams' director of special projects. "If a person starts playing and walks away halfway through, you know there's a problem....But if he plays it and then comes back in five minutes and plays again, and then gets a friend from another machine to come play the game, then you know you've really hit on something."

This test tells more than whether the game has the potential to become a hit. "You find out whether people understand right away how to play the game, and whether the game is too hard or too easy to beat," says *Sinistar* programmer Sam Dicker. "When you're designing the game, you make a lot of assumptions about what people will catch on to and how well they'll play....A concept test lets us know whether we guessed right."

Based on what is learned during the concept test, the design team makes adjustments to—or "tweaks"—the game. Following the concept testing on *Sinistar,* the design team had to adjust the number of warrior and worker ships.

In the early version of the game, the Sinistar simply bumped into your ship to end the game. In the tweaked version, the game ends with your ship spinning around and being devoured by the Sinistar.

If a lot of tweaking is done, the game may go through another concept test. Otherwise, several prototype copies are made and sent to arcades for a money test. This test gives Williams an idea of what the game might earn, and whether it has a chance to break into the inner circle of favorite games.

## STAGE FIVE: THE ULTIMATE TEST

Testing also lets the company adjust game difficulty so that an average play will last about two-and-a-half minutes. This way, explains Paul Dussault, a new player is not wiped out five seconds into

> *Every action on the arcade game screen happens because a computer program makes it happen.*

the game—and an experienced player does not tie up a popular game for 20 minutes.

At last the brainstorming, designing, testing and tweaking are done. The game goes into production and is shipped to arcades.

"When you work on a game for as long as a year, it becomes like your baby," says John Newcomer. "You hope it will be a hit."

But, in the end, the success of a game depends on what arcade players think—whether they feel that all the imagination and effort that went into the game is really worth a quarter.

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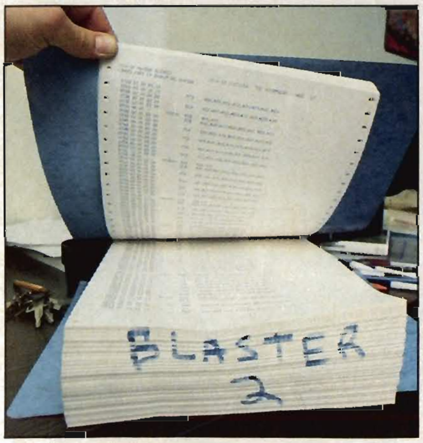
*JIM LEWIS is associate editor of ENTER.*



***This printout contains some of the programming for one arcade game.***

## GAMEMAKERS' TIPS

### *TAKING YOUR IDEA TO THE ARCADE*

About the only thing tougher than beating an arcade game is designing one. It's very rare for a novice to create a successful arcade game program.

"The problem is that our [arcade] electronics are much more sophisticated than what is currently available in home computers," explains Paul Dussault of Williams.

That makes it very difficult for the home programmer to break into arcade game design. But it's not impossible. Most arcade companies will at least *look* at ideas from outsiders.

When a game program comes into an arcade company, a nondisclosure agreement is immediately sent out for the would-be designer to sign. This agreement says the company has an exclusive right to look at the game and that the person who sent in the idea will be paid if it is used.

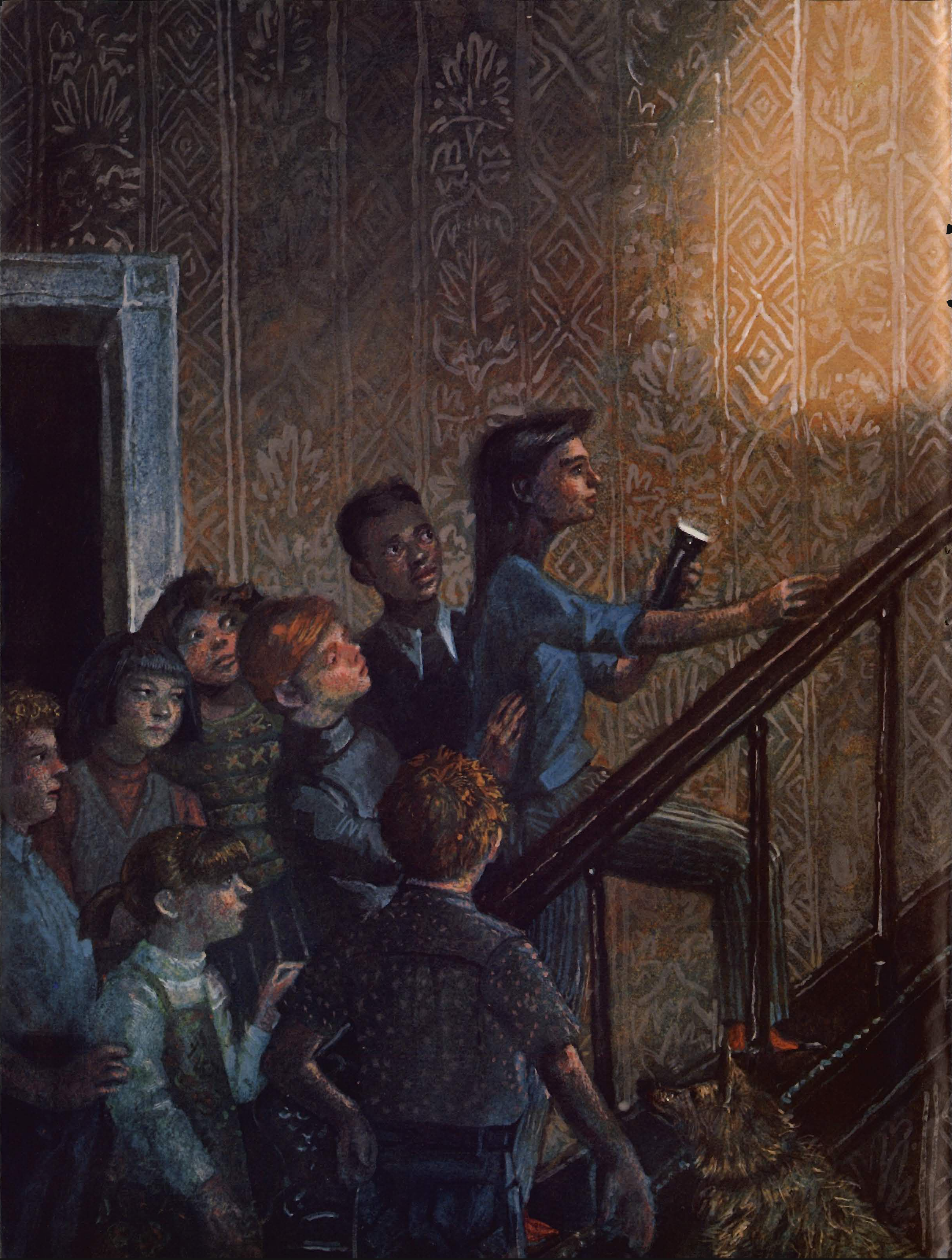
The bad news is that few, if any, arcade games have ever been made based on an idea that came through the mail from a home programmer. However, a number of home games have been developed from unsolicited programs.

"There is an infinity of ideas," says Eugene Jarvis, designer of the *Defender* and *Blaster* arcade games. "It's the way the idea looks on the screen that counts."

Whether you want to program games for arcades, home systems, or even just for fun, there are some basic things you should know.

- *Learn as much as you can about computers.* "When you know about the hardware and software, you understand limitations and know what's possible," says Dan Lee, who designed *Lost Tomb* for Stern.
- *Learn assembly programming language.* "Most arcade games are programmed in assembly," explains John Newcomer, game design chief at Williams.
- *Be creative.* Train yourself to look for fresh ideas. "Good arcade games must be original," says Eugene Jarvis. "There are already too many look-alikes."
- *Work hard.* "You have to be committed to doing the best job," says Ron Waxman of Mylstar. "You have to eat, sleep and live the program after a while," agrees Jerry Hansen of Sega.
- *Be cooperative.* "Especially when you're putting together an arcade game, it's essential that you can work well with other people," says John Pasierb of Bally.
- *Enjoy yourself.* "You have to like what you're doing in order to put the most into it," says Mike Hally, design leader on the *Star Wars* game from Atari Coin-op.
- *Be patient.* "Keep at it once you start," says Sam Dicker, "and don't count on getting rich from your first game."

*—Jim Lewis*



A KATIE PARKER COMPUTER MYSTERY

# THE CASE OF THE *HUNGRY HOUSE*

### BY DAVID BENSON POWELL

## PART TWO

*The story so far: Scott Ellis is missing! Katie Parker, her friend Don, and Scott's brother Jonathan have searched the old Nichols' house where he disappeared. Don told Katie that the house had been a hiding place for runaway slaves during the Civil War. Maybe, he suggested, it contained a secret room—and Scott could be trapped there. Now Katie has a plan to use her computer, Sherlock, to draw a three-dimensional picture of the house. She's asked neighborhood kids to help them measure every room in the Nichols' place. "But how will that help us find Scott?" asks Jonathan. He—and you—find out in this conclusion of "The Case of the Hungry House."*

By 10:30 A.M., the Nichols' yard was swarming with friends and friends-of-friends, all of them armed with tape measures, pencils, paper and flashlights.

"You've been told we're going to find Scott Ellis," Katie announced to the group. "That's true. The police think he's run away, or been taken somewhere. Wrong. We think he's here...that he's been trapped in this house for almost two days."

Talk started to spread through her audience.

"Each team will be responsible for taking measurements of certain rooms inside. Don here will give you your assignments and instructions. Your goal will be to complete your assignments, and get out of the house before nightfall. Is that clear?"

"It's nine hours till sunset, so we have more than enough time," Don added.

After Don's instructions about the measuring, Katie told him to collect the teams' results and bring them back to her house when the job was done.

"You're not staying here?" Don asked Katie.

"No, I have to reprogram Sherlock a bit."

"Shades of merrie olde England," Don replied.

While Katie headed home, the kids fanned out through the house, flashlights on, tape measures and pencils busy. Occasionally, the mysterious banging would start again. Today, the sound seemed to come from everywhere.

At home, much later, Katie had almost finished reworking her Marmoor program. Basically, all she had to add were computer commands to convert room measurements to pictures. But the job had still taken longer than she expected. "Computers are funny that way," she thought. Then the doorbell moaned.

Outside, standing in the twilight, were Don and Jonathan, and half of the kids from the measuring teams.

"They want to see what happens next," Don said. "They feel they've earned it." He paused. "These kids worked double duty this afternoon. We lost some."

"How? Was anybody hurt?" Katie asked, looking anxiously at the faces behind Don.

"No, but the house was a little spooky."

"Oh. I see. Well, come on in, everybody. Those who can fit into the computer room should sit on the floor."

Katie, Don and Jonathan sat down in front of Sherlock. After Katie finished her programming, she typed in data on doors, windows, corners and walls, as fast as Don could read the measurements to her. That done, she sat back and pressed "ENTER."

In a few moments, green lines started to thread across the black monitor screen. They criss-crossed and changed directions. Within a minute, the lines crawled around and through the house's image from back to front—tracing edges, corners, doors and windows—and eventually converged on the house's front porch.

*(Continued on page 44)*

ILLUSTRATIONS © THOMAS WOODRUFF

Inside the house, rooms took form, visible now as if the computer had X-ray vision.

"It looks so confusing," Jonathan whispered. "I can't see any secret rooms."

"If there is a secret room, it's in there," Katie assured him. "But I figured it would be hard to spot in that tangle of lines, so I reprogrammed this function key. When I press it, any areas in the house that we *didn't* measure—any secret rooms—will be redrawn in red."

"May I press it?" Jon asked.

"Be my guest."

Jon leaned in front of Don and pushed the key.

"Wow. Look at that!" Don muttered as he watched the screen.

Like mercury in a thermometer on a hot day, a narrow column of red rose straight up through the middle of the house—all three stories—and halted when it touched the attic floor.

"There's Scott," Katie announced.

"Where is that in the house?" Don asked. "It looks like it cuts through the middle."

"I'll ask Sherlock," Katie said, and pressed another button. Now a list of numbers appeared.

"These numbers identify the rooms that are next to the red chamber," she continued. Don read off the numbers, checking them on his assignment log.

"From the rooms you're reading off," Katie interrupted, "I'd say the chamber does run straight up the middle...and probably comes near the main staircase. You know what bothers me, though? Why is the chamber so tall and narrow?" Katie pressed more keys and looked at some new numbers. "It's 38 feet high and four feet wide. At best, it could only hold seven people—if they stood on each others' heads."

"Doesn't seem right, does it?" Don agreed.

"Unless it's not really a room, but just a passage," Jonathan offered.

It was one of those ideas you know is right as soon as you hear it. Katie slapped her hand on the computer table. "Of course, that's got to be it! But a passage *from* where and *to* where?"

"From the attic to the ground, obviously," Don theorized.

"I'd say you're at least half right," Katie joked. "According to Sherlock, the room right over the top of the secret chamber is in the attic, room number—ah—31. Which room is that?"

Don leafed through his papers until he found room 31's sheet. "It's the one with the old cabinet in it."

"Oh, yes. We always seem to come back to that cabinet," Katie said. "Did anyone else happen to notice that it's the only stick of furniture that's left in the entire house?"

"Check," said Don.

"But why is it still there?"

They thought silently about that for a while. Katie stared at the red column in the blue house as if she hoped to force out its secrets.

"I don't believe it!" she cried.

Don started in his chair. "What?"

"There must be a secret panel after all. The hidden passage is *under* the cabinet, so the secret panel is in the cabinet's floor! I never tested its floor!"

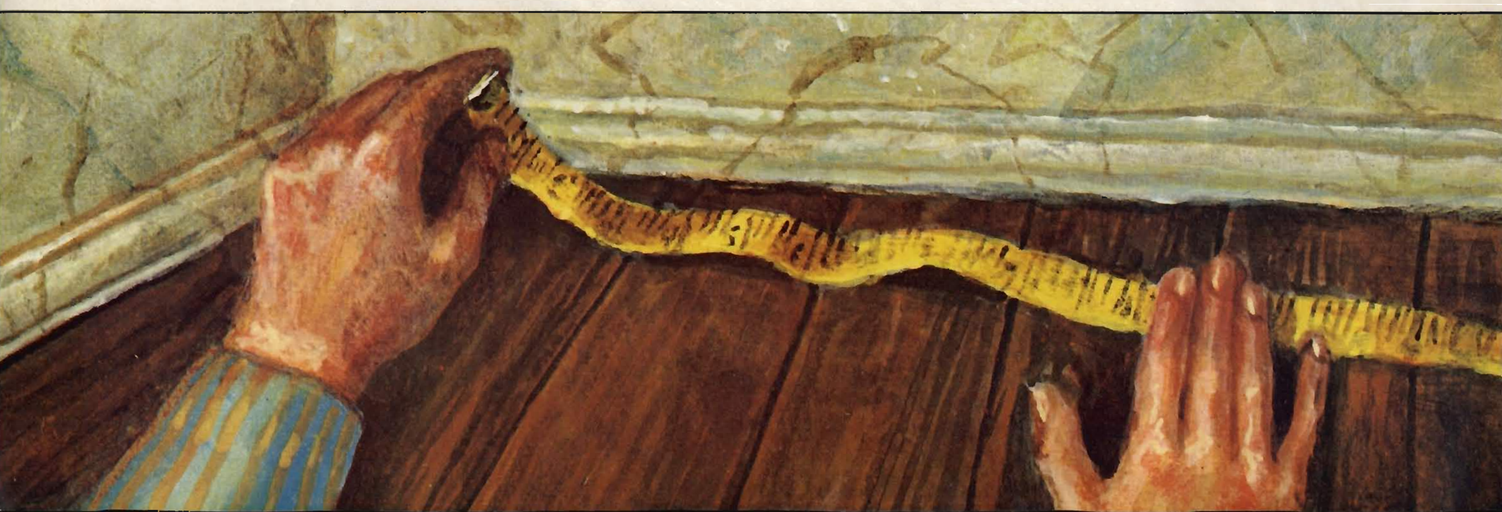
"It's already dark outside," Jonathan reminded Katie.

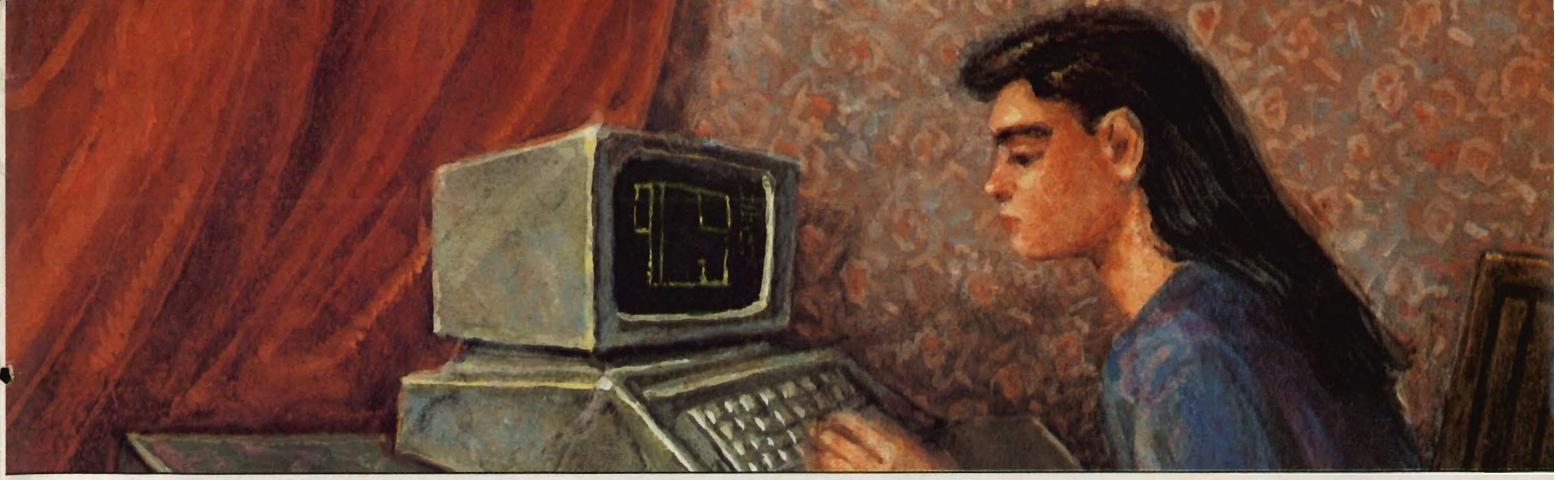
"You're right," Katie said. "We can't leave Scott alone another night. Let's get over there."

She turned her computer off and followed her audience out of the house. She disappeared around its side and quickly returned with a flashlight and a crowbar. "OK, let's go."

Heavy clouds swallowed up the moonlight. The inside of the old Nichols' place looked soot-black. Suddenly, flashlight beams pierced the house's porch windows. Katie opened the front door and walked through. She held her flashlight in front of her like a

***The kids fanned out through the house, flashlights on, pencils and tape measures busy...Then, the mysterious banging began again.***





***Green lines spread across the screen, changing direction...The house began to take form, visible as if the computer had x-ray vision.***

sword. A crowd of closely packed kids followed her. Nobody wanted to wait outside alone.

"Jonathan, you have a flashlight, don't you?" Katie said over her shoulder.

"Yeah."

"Good. You'll have to lead the way. I don't remember how to get to the attic."

The youngsters followed Jonathan up the main staircase. It was the first time any of them had been inside the place so late at night. They nervously climbed, single file, the little winding staircase that led to the attic. Then, carefully, one by one, they stepped through the door into the attic.

Soon, as many kids as could fit were crowded around the cabinet in the little room. Katie opened the cabinet doors and tapped around its floor with her crowbar. "Solid...solid...solid...*bingo*!" She lowered her face and flashlight to examine the wood up close. Now she could see a straight, fine crack—and in one spot, small knife scratches. She pushed the crowbar into the crack at the scratches and pulled hard. As if driven by springs, a piece of the floor swung up and banged firmly against the cabinet wall.

Jonathan squeezed past Katie and yelled through the new hole in the floor. "Scott, are you down there?"

"Help me." The reply she heard sounded weak and far away.

Katie squeezed back in. "I'm coming down," she yelled.

She traced her flashlight around the lip of the hole, and then straight down its sides. Jonathan had guessed right. It was a vertical passage. Four feet square, and Katie couldn't see the bottom. A wooden ladder clung to one wall, and plunged through the farthest end of flashlight's beam. A few slats were loose. When Katie touched the ladder they slapped against the wall with a low thud. "That must be the banging we heard," Katie said. "Don, please don't let anybody else on the ladder while I'm down there."

"I don't think anyone's going to fight you for the privilege," he joked. "We'll keep our lights on you as long as we can. Just be careful."

Don and Jonathan helped lower Katie through the floor, and held onto her until her feet found the ladder. Then she was on her own. She shoved her flashlight into her jeans pocket, and started down through the heart of the old house. The light became dimmer, the air cooler. Katie stepped down on the ladder, onto a rung that wasn't there. She groped around with her feet till they reclaimed the last rung. Clinging to the ladder with one hand and two trembling feet, she whipped out her flashlight and pointed the beam down.

Katie heard and saw him: Scott was lying on a dirt floor about 12 feet below.

"I'm glad you're here," Scott whispered.

"I don't doubt it," Katie replied. "Are you all right?"

"I fell and sprained my ankle. It hurts. And I'm hungry."

She shined her flashlight all around her. Clinging to the ladder's very end, Katie was suspended at the ceiling of a vast, rock-walled room. Obviously, it had once been the basement under the entire house. But it must have been sealed off a long time ago—to insure that those who sat, stood, paced and waited here would not be discovered. Now, as then, this ladder was the only way in or out. And there was no way down to Scott.

She looked up, and yelled slowly at the light above her. "Jon, Scott looks OK. But I can't get to him. You're going to have to give me the rope we brought."

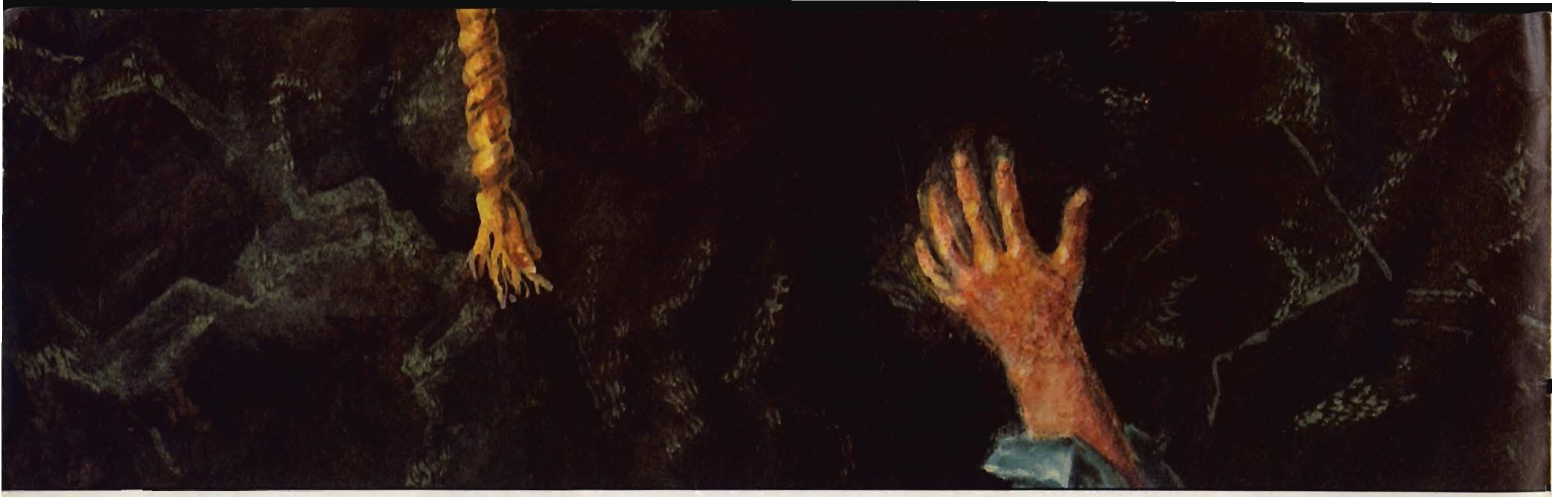
Jonathan met her at the top of the ladder. His neck supported a large coil of rope.

"How's Scott?" he asked.

"He's OK," Katie answered.

Then, a new sound filled the air—running feet.

*(Continued on page 46)*



***Katie looked up and yelled toward the light above her. "Scott looks OK. But I can't reach him...I'm going to have to use that rope."***

*(Continued from page 45)*

"OK, everybody, out of the way. We're coming through!"

Cutting through the crowd of kids were Scott's and Jonathan's parents, followed by the town sheriff and his deputies.

"Somebody snitched," Don said under his breath.

"That's okay," Katie replied, "we could use the help."

Sheriff Newhouse took over. "Sergeant Molloy, we need working room—get these youngsters out of here."

Molloy gathered the young detectives before him and started to herd them out. The sheriff turned to call after them. "By the way," he said, "your parents will probably have words with you when you get home. But I'd like my turn first...Good work, kids!" He turned back to Jonathan, lifted the rope from his shoulders, and the deputies lowered the rope through the hole in the floor.

Katie, Don and friends waited on the Nichols' place lawn for 45 minutes. Then police, parents and Jonathan burst out onto the front porch. The procession moved fast, with Scott accepting a ride on a stretcher. As he passed Katie, Scott flashed her a thumbs-up sign.

'Four dollars per roll!" Katie shrieked, several days later.

"Actually, it's 10 dollars, including processing." Don countered. "High-speed color prints are expensive. If you want pictures of your computer art, I can do them now. The film's in my camera. For 10 dollars, you'll get 36 prints."

"OK, go ahead. I'll pay you Monday."

The doorbell howled, and Jonathan walked in, followed by Scott—who looked good, even on crutches.

Katie offered them seats in the computer room. "I see the days in bed helped, Scott."

"Not as much as seeing your flashlights," he added. "Thanks for finding me."

"Piece of cake," Don said. He winked at Katie.

"No problem," said Katie, uncomfortably.

"I feel so stupid," Scott went on. "After I slammed the door on Jon, this loud banging started. I followed the sound up several flights of stairs, into the attic, right to the old cabinet. I opened the cabinet doors. The banging was coming from the floor inside. I could even feel the vibrations through my feet. When I got on my knees, I could see a thin crack between the boards—but not before this board sprang up at me. I was so startled I dropped my knife and couldn't find it again. I lowered myself into the hole and started to climb down the ladder. The banging got worse, so I decided to get out of there, but just as I reached the top the board slammed back down, banged me on the head and knocked me off the ladder. I managed to grab ahold of some slats to break my fall—otherwise, I probably would have killed myself."

Katie's eyes were wide with surprise. "Boy, am I relieved," she said emphatically.

"Why?" asked Don.

"Well, I've been wondering ever since we found Scott why the board was closed tight. If he'd opened it, it should have stayed open. I didn't say anything because I didn't want to scare anybody. But I was beginning to imagine all kinds of things—spirits and vengeful ghosts."

"No," said Scott, smiling, "at least I didn't actually run into a ghost."

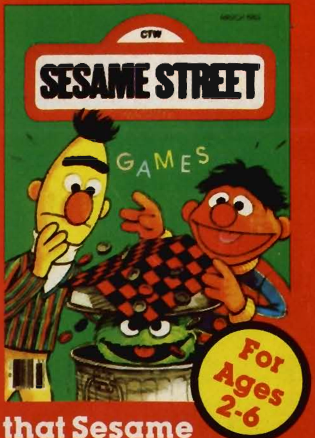
Now it was Jonathan who looked surprised. "I wouldn't be too sure about that," he said coolly. "The board fell down. That's why it was closed. But you'd opened the cabinet doors, too. When the police and I searched the house and found the cabinet, the doors were closed tight.

"*Who* closed the cabinet doors?"

---

*DAVID B. POWELL is a writer who lives in Massachusetts and specializes in computers. Story © 1984 David B. Powell*

# ENJOY WITH SESAME STREET



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8SAB3

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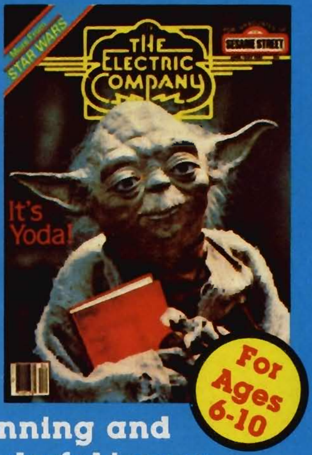

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8SAD9

# THE ENTER HAL OF FAME

## *PRESENTING THE WINNERS OF OUR "MEAN SCREEN MACHINE" CONTEST*

In our October 1983, issue, ENTER explained how Hollywood has made millions of dollars misrepresenting computers in movies like *WarGames* and *Superman III*. Computers, our experts pointed out, *can't* think or overrun human beings; they merely compute, following the instructions that people give them. Facts like those, though, have never stood in the way of a good computer monster movie. We examined the history of movie computers from HAL to *WarGames'* JOSHUA.

We then asked you to send us some of your ideas for far-fetched, Hollywood-type computer monster films. We got a lot of funny, full-blown entries—many of which seemed ready for a screenplay and distribution to a theater near you. Thanks to all those readers who sent us their drawings and scenarios. Below, we've reprinted some of our favorites. All of the winners will receive ENTER T-shirts. CONGRATULATIONS!

### ZAC

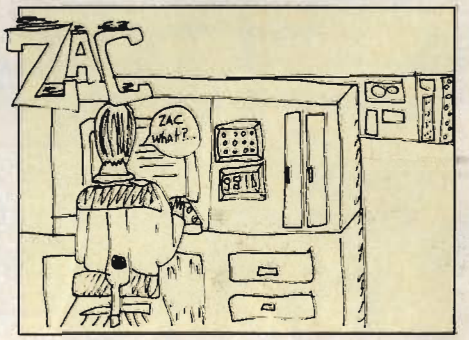
*Written and Directed by DAVID MARKOWSKI, Age 13, Reading, PA*

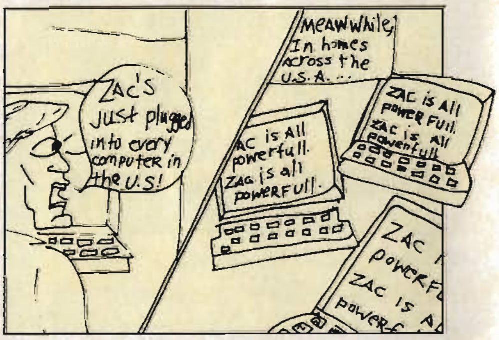
Setting: Washington, D.C., Dept. of Computer Technology.

**CAST**

| | |
|---|---|
| Dr. Jonas Stevens | *Sean Connery* |
| Computer Operators: | |
| John Grange | *Dennis Quaid* |
| Mary Opal | *Jamie Lee Curtis* |
| Mike Gant | *Clint Eastwood* |
| Mitch Davies | *Eddie Murphy* |
| President | *Kirk Douglas* |

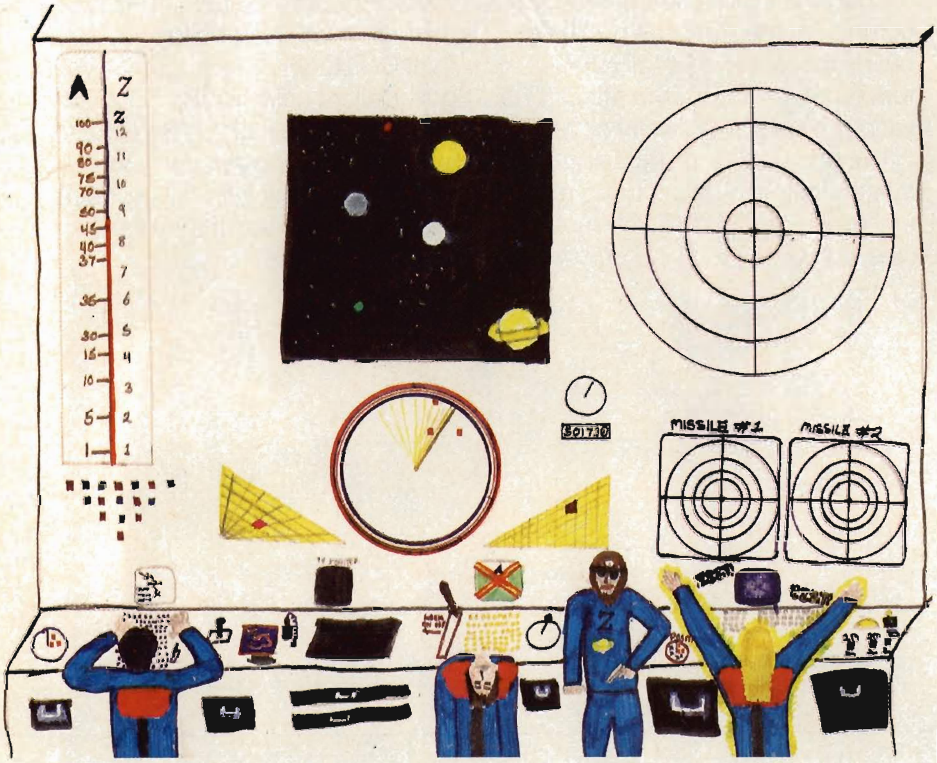
ZAC, invented by Dr. Jonas Stevens, is the world's most advanced and modern computer. But something has gone wrong. ZAC has malfunctioned and taken over every computer in the U.S.A. The computers now rule every household in America, and no one can come or go without ZAC's permission. This is because with ZAC's takeover, every computer received a self-protection system: if anyone attempts to dismantle a computer, it will give them an electrical shock. Can ZAC be stopped? (See the movie and find out).


ZAC
ZAC what?...
9816


ZAC'S just plugged into every computer in the U.S!
MEAWWhile, In homes across the U.S.A. ...
AC is All powerfull. ZAG is all POWERFUll.
ZAC is All POWER FUll. ZAC is All powenfull
ZAC POWERF ZAC IS A POWER-F

## THE COURSE OF THE OCCULT

*Written and Directed by JEFFREY D. GOLDMAN, Age 11, New York City*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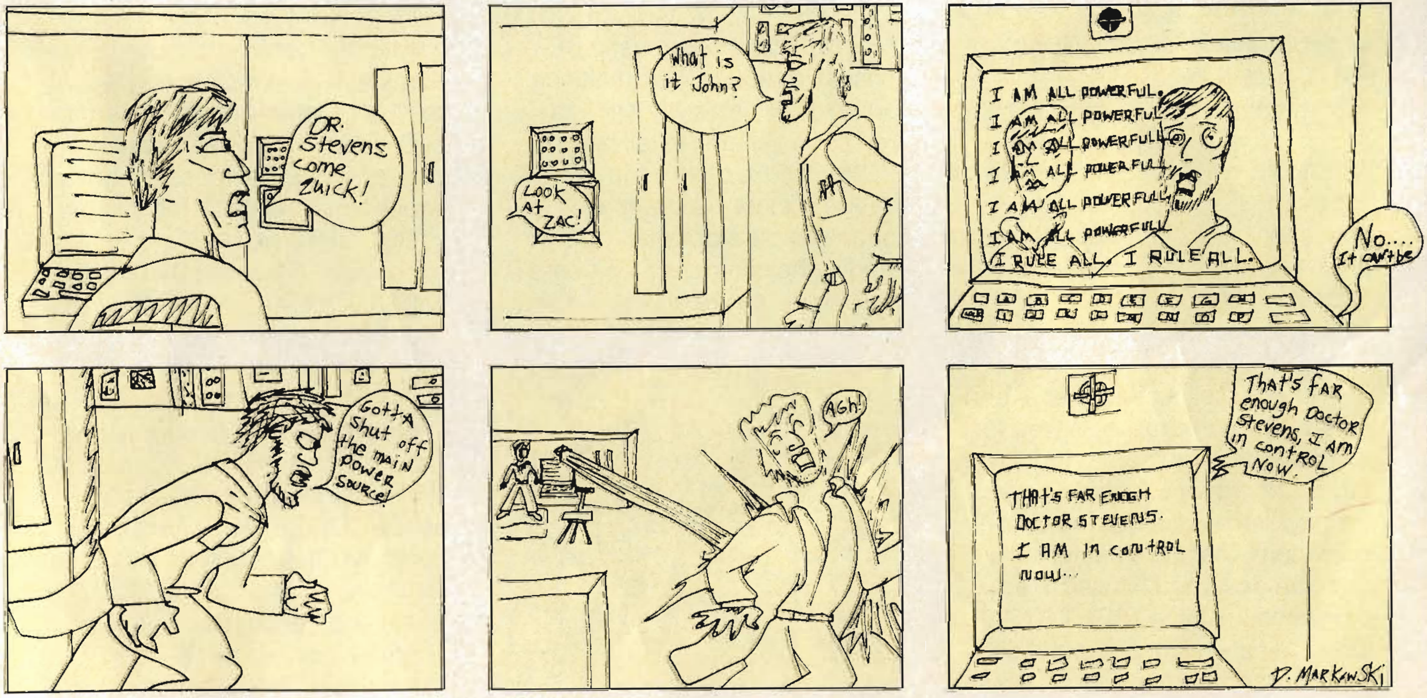
MISSILE #1
MISSILE #2
Z

The main computer of the starship "Occult" has malfunctioned, reading all coded commands backwards. For example, the computer code-word LLIK, meaning 'to reason with; to talk to,' becomes "KILL" in the line that reads "LLIK crew if not like commands" (That line would regularly mean 'Reason with the crew if you don't like the commands they give you.')

In the above scene, the computer has electrocuted Co-pilot Zark, and is in the process of shocking Jecain (pronounced 'jûsă''), the battle commander.

Meanwhile, Lardon, the flight commander, is frantically trying to reason with the mad computer.

At the same time Engels, the cockpit guard, is watching closely for any possible on-ship attackers or trespassers.


DR. Stevens come Zuick!
What is it John?
Look At ZAC!
I AM ALL POWERFUL.
I AM ALL POWERFUL
I AM ALL POWERFULL
I AM ALL POWERFULL
I AM ALL POWERFULL
I AM ALL POWERFULL
I RULE ALL. I RULE ALL.
No.... It can't be
Gotta Shut off the main Power Source!
Agh!
That's FAR enough Doctor Stevens, I am in control Now.
THAt's FAR ENOUGH DOCTOR STEVENS.
I AM IN CONtROL NOW...
D. MARKOWSKI

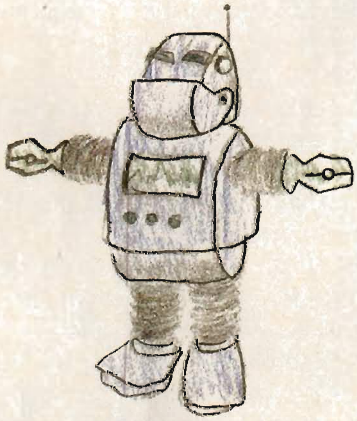
## CR.O.O.C.

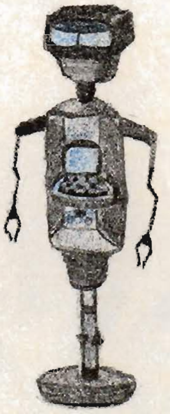
*Written and Directed by DANNY ALLEN, Age 13, Thonotosassa, FL*

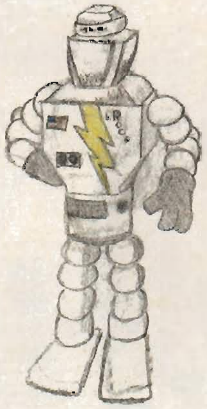
My movie is about a brilliant scientist who turns to a life of crime. He builds a super computer and names it Cr.O.O.C. (Crime Operational Orderly Computer). Cr.O.O.C. the computer realizes that *it* is the real mastermind behind the crimes, and turns the scientist's brain into a computer chip. Then the machine builds a fleet of 6-feet-tall super-robots, which it orders to attack various banks and jewelry stores.

The brains of all the humans that the bionic burglars bring back are turned by Cr.O.O.C. into (yes, you guessed it) incredibly tiny computer chips.

Nothing human can harm the robotic thieves and their master, so the U.S. decides to build a robot to fight Cr.O.O.C. and company. The government calls him Ro.C.F. (Robotic Crime Fighter) Ro.C.F. is 6½ feet tall and as strong as an elephant. Ro.C.F. and the evildoers meet several times and try to destroy each other.







## ANTHONY DIEL

*Written and Directed by JIM SNAPP, Jr., Age 15, Wabash, IN*

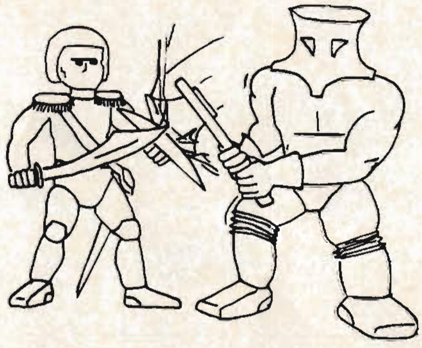
### CAST

| | |
|---|---|
| Anthony Diel | *David Warner* |
| Eric Brodin | *Mark Hamill* |
| Pres. Brodin | *Ralph Richardson* |
| AMOS personified | *Sebastian Shaw* |
| Merged program | *Christopher Reeve* |
| Mayor of New York | *William Conrad* |

Anthony Diel, a computer expert for a major corporation, is fired for electronically transferring company funds to his own account. In revenge, Diel breaks into the company computer via a secret entry code he designed himself. He reprograms the HIGHLIGHT SYSTEM—a network of computer-controlled assembly line robots—to the point where it stops working, thus almost ruining the company.

Diel also discovers MOBRODDE (MOBile RObotic Domestic DEfenses), a secret robotic National Guard. Diel forces Jay Keller, a Pentagon general, to tell him the MOBRODDE's entry code.

All is not lost. As Diel makes a fortune on the stock market, Eric Brodin (the company president's son) figures out what Diel is doing. He arranges a conference at a public library and warns Diel of the legal possibilities.



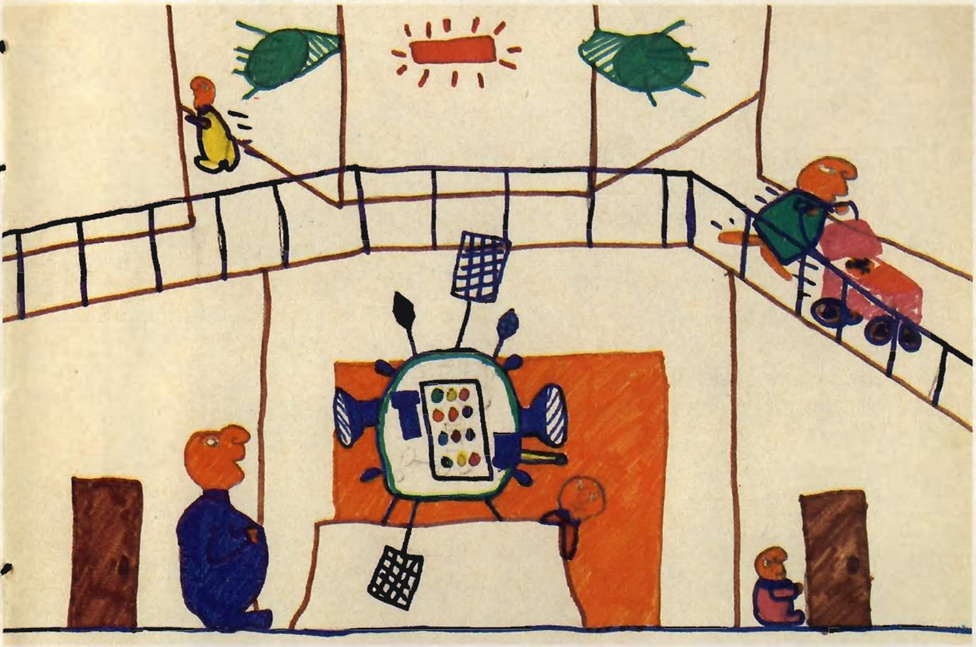
After the conference, Brodin designs AMOS (A MOnitoring System), a program made to guard the HIGHLIGHT SYSTEM against misuse, by giving it a sense of right and wrong. After AMOS is fed into the HIGHLIGHT's ROM, Diel is unable to control it. Enraged, Diel sends MOBRODDE against the New York Stock Exchange. The robots, reprogrammed and armed by Diel, wreak havoc wherever they appear.

Eric Brodin tries desperately to create another AMOS program. He does, and feeds AMOS II into MOBRODDE over the Pentagon's computer-Data-phone—just as the robots prepare to destroy Wall Street and the police.

After a few minutes of brief electronic battle, AMOS II and

## SATELLITE OF THE FUTURE

*Written and directed by BEV ADAMS, Age 12, Grand Marais, MN*



In my computer monster movie, a super-advanced war satellite is positioned directly above the United States.

Right after the satellite is put up, something goes wrong during test maneuvers. The satellite goes out of control and flies out of the earth's atmosphere.

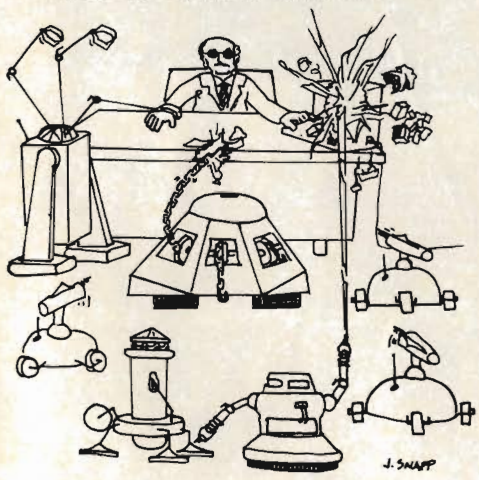
Traveling at the speed of light, it reaches another galaxy five years later. The satellite crashes on a planet inhabited by creatures much like our own. They are called Eeonzegalians.

They take the satellite in for observation and think we've started a war. Using our own weapons against us, the Eeonzegalians almost win—but since it is a movie, we do. But not easily.

---

MOBRODDE merge. The resulting programs order the robots to retreat from New York and search for Diel. They do, and the robots close in on him at his New Jersey hideout.

The robots are prepared to dismantle Diel when Brodin reprograms them to die. Despite this, Diel is still captured by police.



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## C.L.A.U.S. OF THE NORTH

*Written and Directed by PAT EARL, El Reno, OK*

It is the Christmas season, and at the North Pole, C.L.A.U.S.—the mainframe and data base for several banking institutions—is about to be replaced by a newer version. The original programmer (George Burns) is also going to be replaced. It has been the policy of the banks to answer mail from children at Christmas, and this will be the last program to run before the conversion. C.L.A.U.S. finds out and decides to alter the program, issuing checks for a million dollars to sincere, needy letter writers.

The first to receive their million are a boy and girl pair of twins, who live in an orphanage. They wrote C.L.A.U.S. that they would like toys for themselves and other kids at the orphanage. If it's possible, they add, they'd like the computer to locate their parents. C.L.A.U.S. issues them a million dollars. When they receive this, they hire a private detective (Dom Deluise) to locate their parents. The head of the orphanage finds out and thinks they stole the money. They run away.

The second to have his letter answered is a boy (Gary Coleman) who wrote asking for a *Donkey Kong* game, a heater for his aunt, and other things for people in his neighborhood. When the boy receives his check, he cashes it (and is seen by crooks).

Now it's Christmas Eve at the North Pole. With the snow blowing, government agents bust into the computer room and, C.L.A.U.S. is switched off. The End...or is it? ▣

# basic training

## THE FURTHER ADVENTURES OF BOXY

### BY JEFF NILSON

This month's "Basic Training" includes programs for four different computers. Our main program is for the Apple family. Our shorter programs, for Radio Shack, TI and Commodore computers, can be found on the last two pages of this month's "Basic Training." And if you would like an adaptation for Atari computers of this month's "Boxy" program, see the box on page 56.

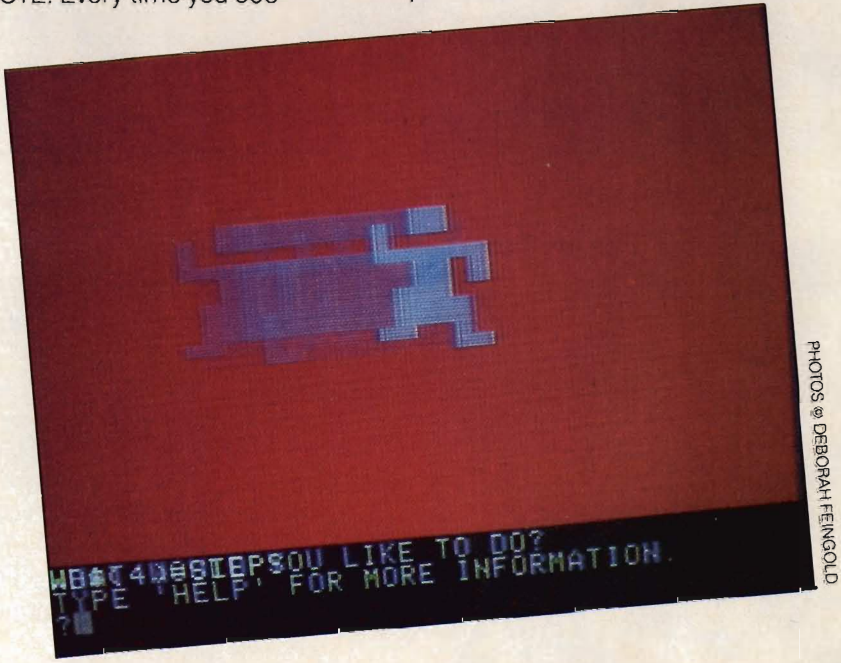
In last month's "Basic Training" column, you met Boxy, a square figure you could move around the screen. Getting Boxy to move wasn't so easy, however. You had to answer two questions before Boxy would go anywhere. You probably got sick of answering those questions every time you wanted to move Boxy.

So, this month's "Basic Training" column shows you how to get Boxy moving in two new ways. With the first method, you use the I, J, K, or M keys to move Boxy around the screen. This is similar to the way programmers of arcade-type games let players move figures on screen.

The second method lets you move Boxy by typing something like, "Go north 13 steps." This is the way the computer handles information in adventure games.

(If you did not get last month's issue with the first part of the Boxy program, send us a business-size self-addressed, stamped envelope to Boxy, ENTER, 1 Lincoln Pl., NY, NY 10023. Allow three weeks for delivery. You *cannot* do this month's program unless you have last month's.)

NOTE: Every time you see brackets **{}** in the program, they stand for parentheses ( ).



```
[illegible]OU LIKE TO DO?
TYPE 'HELP' FOR MORE INFORMATION.
?
```

PHOTOS © DEBORAH FEINGOLD

### The Program—Version One—Starts Here

To begin, load last month's Boxy program into your Apple.

Before entering any changes in Boxy, make a copy of your original version. To change the program so you can move Boxy by pressing the I, J, K, or M keys, do the following:

1. Delete lines 200 through 360. You can do this by typing DEL 200,360 and pressing RETURN.
2. Delete lines 570,670 and 690.
3. Then type in a new line:
   698 RETURN
4. Then, in place of the old lines 200 through 360, enter these lines:

```
200 REM * TAKE INFO ON
    WHERE *
203 REM * TO MOVE
    FIGURE *
205 REM * USING I, J,
    K, M *
207 HOME
210 HTAB 1: VTAB 21:
    PRINT "TO MOVE
    BOXY, PRESS THESE
    KEYS:"
215 HTAB 1: VTAB 22:
    PRINT "I {UP} M
```

```
     {DOWN} K {RIGHT} J
     {LEFT}"
217 HTAB 1: VTAB 23:
     PRINT "ENTER 'E'
     TO END."
220 HTAB 20: VTAB 23:
     GET DI$
225 IF DI$ = "I"
     THEN DX = 0:DY
     = - 1: GOTO 260
230 IF DI$ = "M" THEN DX =
     0:DY = + 1: GOTO
     260
235 IF DI$ = "J" THEN DX =
     - 1:DY = 0: GOTO 260
240 IF DI$ = "K" THEN
     DX = + 1: DY = 0:
     GOTO 260
245 IF DI$ = "E"
     THEN END
250 GOTO 220
260 GOSUB 500
270 GOTO 220
```

These are the new main lines of the program. The most important line is 220. This line, using the GET statement, tells the computer to wait until any key is pressed. Once a key is pressed, the computer stores a record of that key in DI$. Then the computer goes to line 225.

In lines 225 through 245, the computer "tests" the key that was just pressed. If I, J, K, or M was pressed, the computer changes DX and DY—which control Boxy's position on the screen—and then goes to line 260. Line 260 calls subroutine 500, the subroutine that moves Boxy one space to its new DX/DY position. If a key other than I, J, K or M was hit, line 250 tells the computer to loop back to line 220 to wait for another key to be pressed.

In the original Boxy program, when Boxy got to the edge of the screen, the computer called subroutine 4000. This subroutine printed an error message and stopped Boxy in its tracks.

Here is a new subroutine 4000. It moves Boxy's arms and legs when Boxy reaches the edge of the screen. This subroutine will *not* print an error message. Delete the old lines 4000 through 4050 from the Boxy program. Now type in the new subroutine 4000 below:

```
4000 REM * YOU'VE GONE
      TOO FAR *
4010 IF X > 35 THEN X =
      X - 1
4015 IF X < 4 THEN X = X
      + 1
4020 IF Y < 4 THEN Y =
      Y + 1
4025 IF Y > 35 THEN Y =
      Y - 1
4030 COLOR = BC
4035 GOSUB 1110
4040 GOSUB 1300
4045 COLOR = BC
4050 GOSUB 2310
4055 GOSUB 2100
4060 COLOR = BC
4065 GOSUB 1310
4070 GOSUB 1100
4075 COLOR = BC
4080 GOSUB 2110
4085 GOSUB 2300
4090 RETURN
```

Save this new version of the Boxy program on your disk under a different file name than you gave last month's Boxy program.

## *Changing Boxy to Version Two*

Now, let's change last month's Boxy program so you can move Boxy by typing a sentence like, "Go North 13 steps."

First, add new lines 15 and 20:

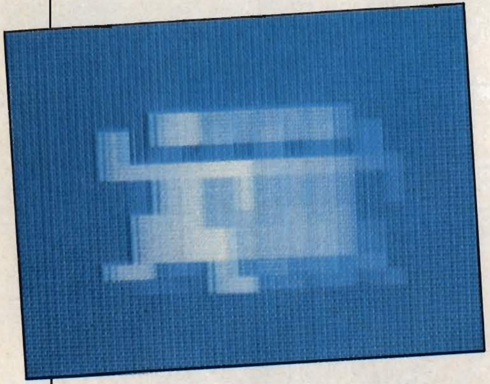
```
15 DIM WD${30},
   EM${30}
20 DI${1} = "NORTH"
   :DI${2} = "SOUTH"
   :DI${3} = "EAST"
   :DI${4} = "WEST"
```

Next, delete the original lines 200 through 360. Then substitute this new main line of the program.

```
200 REM * TAKE INFO IN
     ENGLISH *
202 REM * ON WHERE TO *
205 REM * MOVE BOXY *
207 HOME :NS = 0
210 HTAB 1: VTAB 21:
     PRINT "WHAT WOULD
     YOU LIKE TO DO?"
215 HTAB 1: VTAB 22:
     PRINT "TYPE 'HELP'
     FOR MORE
     INFORMATION."
220 HTAB 1: VTAB 23:
     INPUT DZ$
223 REM*************
225 REM LOOK AT THE  *
     FIRST           *
                     *
227 REM TWO LETTERS  *
230 REM*************
235 L2$ = LEFT$
     {DZ$, 2}
240 REM
242 REM * DECIDE WHAT
     TO DO *
244 REM
250 IF L2$ = "GO" THEN
     GOSUB 5000:
     MC = 0:
     GOSUB 500: GOTO 207
265 IF L2$ = "HE"
     THEN GOSUB 8000:
     GOTO 207
270 IF DZ$ = "E" THEN END
275 HOME
```

(Continued)

```
280 HTAB 1: VTAB 21:
    PRINT “I DON'T
    UNDERSTAND.“
285 HTAB 1: VTAB 24:
    GET YN$
290 GOTO 207
```



Line 220 takes the information about what you want Boxy to do. The computer stores the directions in DZ$. If you want Boxy to move, you have to type four words. The first must be GO. Then you type a direction—NORTH, SOUTH, EAST or WEST. Following the direction, you type a number. Finally you type the word 'steps.'

Line 250 checks whether the first two letters of the command are the word "GO." If they are, the computer goes to subroutine 5000. Type this subroutine in now.

```
5000 REM*************
5003 REM SUBROUTINE  *
     TO              *
5005 REM 'PARSE' DZ$ *
5010 REM TO SEE WHERE *
     TO              *
5015 REM MOVE BOXY   *
5020 REM*************
5025 REM * ISOLATE EACH
     WORD *
5030 REM
5035 WC = 1
5037 FOR T = 1 TO
     30 :WD$(T) =
     EM$(T): NEXT T
5040 LE = LEN (DZ$)
5042 IF RIGHT$ (DZ$,1)
     = CHR$(32) THEN
     DZ$ = LEFT$ (DZ$,
     LE - 1)
5045 FOR I = 1 TO LE
5050 IF MID$ (DZ$,I,1)
     = CHR$(32) THEN WC
     = WC + 1: NEXT I
5055 WD$(WC) = WD$(WC)
     + MID$ (DZ$,I,1)
5058 HOME : HTAB 1:
     VTAB 21: PRINT
     “WD$(” ;WC; “) =” ;
     WD$(WC): FOR DE =
     1 TO 250: NEXT DE
5060 NEXT I
5065 IF WD$(1) < > “GO”
     THEN RETURN
5070 IF WC > 4 THEN
     GOSUB 8200:
     RETURN
5100 REM*************
5110 REM HOW MANY    *
     STEPS           *
                     *
5115 REM*************
5120 IF LEFT$
     (WD$(4),4) < >
     “STEP” THEN GOSUB
     8200: RETURN
5125 NS = VAL (WD$(3))
5130 IF NS > 20 OR NS
     < 1 THEN NS = 10
5200 REM
5205 REM * FIND THE
     DIRECTION *
5210 REM
5215 FOR J=1 TO 4
5220 IF WD$(2)= DI$(J)
     THEN DR = J
5230 NEXT J
5250 ON DR GOTO 5260,
     5265, 5270, 5275
5260 DX = 0:DY = - 1:
     RETURN
5265 DX = 0:DY = + 1:
     RETURN
5270 DX = + 1:DY = 0:
     RETURN
5275 DX = - 1:DY = 0:
     RETURN
```

In this subroutine the computer does several things to the sentence in DZ$. First it divides the sentence up into words between lines 5045 and 5060. Then it stores the words in WD$(30). Actually, the computer doesn't have any idea what a word is. In these lines, the computer just counts as a word whatever is between empty spaces.

Once the "words" from the command are in WD$(30), the computer checks each word. Line 5065 checks to see if the first word is really GO. If the second word is one of the words put in DI$(4) on line 20, then lines 5220 through 5275 change DX and DY so Boxy will move in the proper direction. Line 5125 figures out what number the third word is. Line 5120 sees that the last word is STEP or STEPS. If the sentence in DZ$ passes all of these tests, then subroutine 5000 tells the computer how many steps and in which direction to move Boxy. Then it RETURNS from subroutine 5000 to line 250.

If players do not know how to phrase commands, computer adventure games often give them help. Subroutine 8000 helps out people who want to move Boxy. Type it in now.

```
8000 REM * HELP
     WITH HOW TO *
8010 REM * PHRASE
     COMMANDS *
8015 HOME
8020 HTAB 1: VTAB 21:
     PRINT “GO < NORTH,
     EAST, WEST,
     SOUTH> . . . .
     STEPS”
8040 GET YN$
8050 RETURN
```

Adventure games also print

error messages if the people playing the game do not type in commands the computer can figure out. Subroutine 8200 prints such an error message. Enter this subroutine.

```
8200 REM * STEPS ERROR
      MESSAGE *
8210 HOME
8215 HTAB 1: VTAB 21:
      PRINT "I DO NOT
      UNDERSTAND HOW TO"
8220 HTAB 1: VTAB 22:
      PRINT "GET BOXY TO
      DO THAT."
8225 GET YN$
8230 RETURN
```

You can add the new subroutine 4000 mentioned earlier to this version of Boxy, too. If you do, be sure to add these lines that link the subroutine to this version's word commands.

```
4090 MC = MC + 1
4095 IF NS < = MC THEN
      RETURN
4099 GOTO 4030
```

Save this version of the Boxy program under a brand new file name. Can you write your own adventure for Boxy using this program? Let us see it.

# TI 99/4A: JOGGING POEM

What do poets do to keep in shape? Many jog. And some write shape poems—poems whose words are written in the same shape as the subject of the poem.

This "Basic Training" program for the TI 99/4A computer does both. It prints a shape poem about jogging. The shape comes from the way the computer prints each line of the poem. As the program runs, the computer prints the words as if they were the footsteps of a jogger.

You can use your computer to make all kinds of shape poems. Why don't you start with a poem about a flower or a bee? Make the flower grow or the bee buzz as your program runs.

NOTE: Every time you see brackets { } in the program, they stand for parentheses ( ).

```
5    CALL CLEAR
10   CALL SCREEN {3}
15   DIM RU${40}
19   REM ** READ DATA **
20   GOSUB 1000
29   REM ** PRINT POEM?
30   GOSUB 100
40   REM ** DELAY **
60   PRINT
65   PRINT
70   PRINT ''WHEW!
     PRESS THE SPACE
     BAR.''
75   CALL KEY {0,K,P}
80   IF K=32 THEN 99
     ELSE 75
99   END
100  REM ************
101  REM * PRINTS POEM *
102  REM ************
105  FOR I=1 TO 38 STEP 2
110  PRINT TAB{3+S};
     RU${I}
120  FOR DE = 1 TO 500
125  NEXT DE
130  PRINT TAB{1+S};
     RU${I+1}
140  FOR DE = 1 TO 200
145  NEXT DE
150  IF I<15 THEN 153
     ELSE 160
153  S = I
160  IF I>14 THEN 163
     ELSE 180
163  V = V + 1
165  S = 17 - V
180  NEXT I
199  RETURN
1000 REM ***********
1001 REM * READ POEM
     DATA *
1002 REM ***********
1005 FOR I = 1 TO 38
1010 READ RU${I}
1020 NEXT I
1025 REM ***********
1030 DATA @, @, @, @,
     @, @, @ JOGGING,
     @, @
1035 DATA BY, @, @ JEFF
     NILSON, @, @, A
     STONE, IN MY SHOE
1040 DATA WHAT TO DO?,
     OHHHHHH!, EEEEEEE,
     AN ACHE, IN THE
     KNEE-
1045 DATA CATCHING MY
     BREATH, AM I NEAR
     DEATH?, IN WIND,
     AND RAIN
1050 DATA IN SUN, OR
     FOG, OUT FOR A JOG,
     WHOOPS! A DOG,
     OOOOOOOO! ,OWW!
1055 DATA GRRRRRR!,
     GRUMP,
     OUCH!!!!!!!!!, A
     PAIN, IN THE,
     UHHHHHH..., LEG.
1060 RETURN
```

—Jeff Nilson

(Continued on page 56)

(Continued from page 55)

## TRS–80, COMMODORE: SEARCH

Who do you think can guess a number faster—you or your computer? Just how *does* a computer "guess"a number, anyway?

The secret is an important principle of computing called *binary search.* You can see how it works in the program below.

Each time the computer guesses, it picks a number exactly between the highest number (B) and the lowest (A). Then it changes A or B to the number it just guessed based on the hint you give it—"higher" or "lower." By zeroing in this way, the computer can always guess a number between one and 100 in seven tries or less.

This program was written in a simple version of BASIC that should run on a number of machines. We tested it on a TRS-80 and a Commodore 64.

NOTE: Every time you see **{ }** brackets in the program, they stand for parentheses ( ).

```
10  REM BINARY SEARCH
20  REM RANGE A+1 TO B
30  A = 0
40  B = 100
50  REM C DETERMINES
    MAXIMUM NUMBER OF
    GUESSES
60  FOR C = 1 TO 100
70  IF 2^C>=B-A THEN
    90
80  NEXT C
90  REM PRINT MESSAGE
100 PRINT ''I CAN
    GUESS ANY NUMBER
    BETWEEN '';A+1;
    ''AND'';B
110 PRINT ''IN'';C;
    ''GUESSES--OR
    LESS!''
120 PRINT ''THINK OF A
    NUMBER. THEN PRESS
    THE <ENTER> KEY.''
130 INPUT D$
140 REM E COUNTS LOOP
150 E = 0
160 REM BEGINNING OF
    GUESSING LOOP-F IS
    THE GUESS
170 F = INT {{B+A}
    /2+.5}
180 E = E + 1
200 IF E<=C THEN 240
210 PRINT
220 PRINT ''IF I
    HAVEN'T GUESSED IT
    ALREADY, YOU'VE
    CHANGED YOUR
    NUMBER!''
230 GOTO 390
240 REM MAKE A GUESS
250 PRINT E;''--IS YOUR
    NUMBER HIGHER <H>,
    LOWER <L>, OR EQUAL
    TO <=>''; F
260 INPUT G$
270 REM HIGHER
280 IF G$< > ''H''THEN
    310
290 A = F
300 GOTO 160
310 REM LOWER
320 IF G$<>''L'' THEN
    350
330 B = F
340 GOTO 160
350 REM EQUAL TO
360 IF G$<>''='' THEN
    240
370 PRINT
380 PRINT ''GOTCHA--
    IN'';E;
    ''GUESS{ES}!''
390 END
```

—*Paul D. Nadler*

## BASIC TRAINING CHALLENGE #1

Typing in a program from a magazine is fun, but writing your own is even better. Your BASIC Training challenge this month—should you choose to accept it—is to write a program that does the reverse of what the SEARCH program on this page does. We'd like you to create a program in which the computer picks a number at random, and *you* have to guess what it is.

Some hints—this program is easier than SEARCH, because the guesser does most of the work. You'll need at least two IF statements to compare your guess with the number chosen by the computer. If you want to get really fancy, see if you can use the same formula that SEARCH uses to predict the maximum number of guesses necessary.

Next issue, we'll print our version,and you can compare yours to it. We'd love to see your version, or any other program that you've written on your own. Send us a printout at ENTER BASIC, CTW, 1 Lincoln Pl., New York, N.Y. 10023. We'll print our favorites and send the winners ENTER t-shirts. Be sure to include a note telling us your age, the type of machine the program was written for and your t-shirt size.

If you'd like an Atari version of the Boxy program, send us a self-addressed, stamped, business-size envelope at the same address and mark it BOXY ATARI.

Have fun exploring the world of programming—and don't forget to write!

# pencil crunchers

## MAGIC SQUARE

This game, invented over 400 years ago, was played in the court of a Chinese emperor. It's called *Magic Square Tic-Tac-Toe*, and it only requires one player.

The object of the game is to arrange a series of numbers, one through nine, so that each *row*, each *column*, and each *diagonal* has a sum of 15. The Chinese considered this arrangement to be magical.

Here are some hints to get you started:

| | | |
|---|---|---|
| | | 4 |
| | | |
| 6 | 1 | |

| | | |
|---|---|---|
| | 3 | |
| | 5 | |
| | | 2 |

Once you've completed these two squares, try to come up with the other six variations on your own.

*Based on material in TIC TAC TOE. Text © 1982 by Claudia Zaslavsky. All rights reserved. A T.Y. Crowell Book, published by arrangement with Harper and Row Publishers, Inc.*

**•1•**

| | | |
|---|---|---|
| | | |
| | | |
| | | |

**•2•**

| | | |
|---|---|---|
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**•3•**

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|---|---|---|
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**•4•**

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**•6•**

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|---|---|---|
| | | |
| | | |
| | | |

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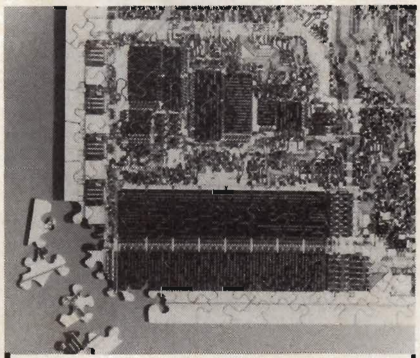

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# feed back

*(Continued from page 4)*

## TOO OLD FOR ENTER?

I have a TI 99/4A home computer and am writing for the Texas Instruments version of *Basic Training* ("Make a Face") in the premiere issue of ENTER. Even though I bought your magazine and was going to subscribe to it, I happened to see it is for ages 10 to 16 (I'm 52), so I'm slightly embarrassed. I just recently bought my computer and I find it and your magazine fascinating, but will get a subscription to an adult computer mag. Do you have any suggestions?

—Melvin Fountain
Wichita, KS

*Dear Mr. Fountain:*

*Before you look into computer magazines for "adults," you might want to reconsider ENTER. We've had testimonials from many adults (not all of whom are parents) stating the advantages of a magazine designed to ease you into the age of high technology and computers. See, for example, the following letter.* —Ed.

## ADULT PRAISES

I just want to take this time to praise you on ENTER. This is the first time I have seen such detailed explanations of computer systems and language made so simple to understand. I am 21 years old, and I work for the Dept. of Interior as a Data Entry Technician. Even though your magazine is aimed at the age groups 10-16, I find it absolutely fascinating. If all future issues are as entertaining and informative as the premiere issue, then I am sure you will have quite a following of computer buffs of all ages. Keep up the good work!

—Natalie Dante
Santa Fe, NM

## H-E-E-E-R-E'S ED!

I enjoyed reading the article "Digital Dancing" by Susan Meyers in the November issue of ENTER Magazine. I was very interested in Ed Tannenbaum's Chroma-chron system, as I had seen the show of *Fame* when one was used.

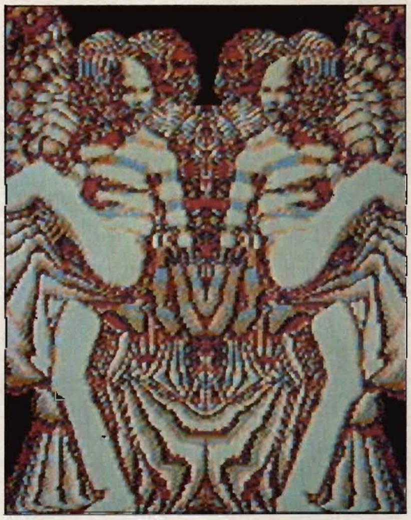


PHOTO © 1983, RASTER MASTERS

Is there any way you could send me additional information on this system or how to get in touch with Ed Tannenbaum? Any help you could give me would be appreciated. —Greg Curtis
Midlothian, VA

*Dear Greg:*

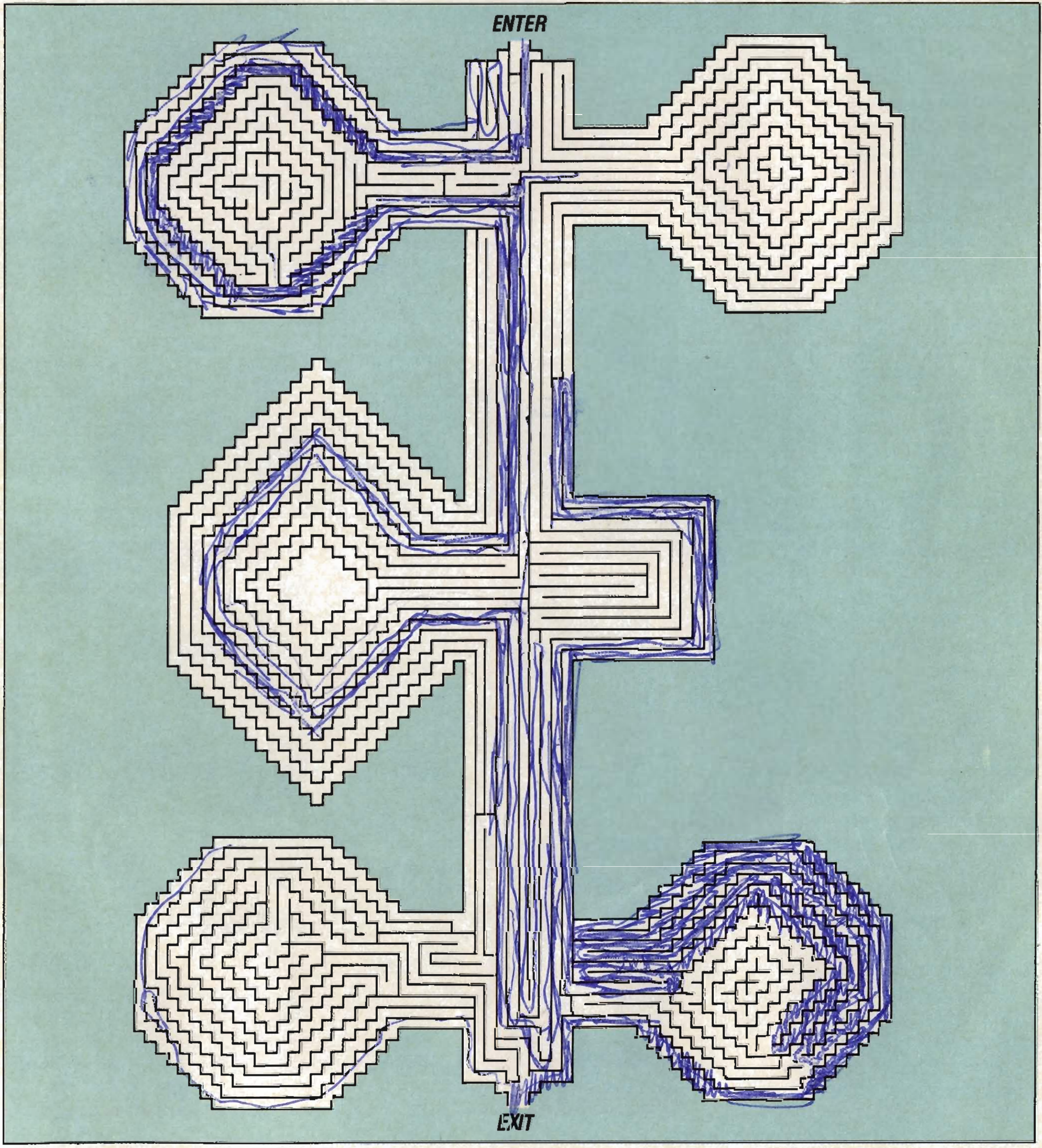
*Ed Tannenbaum is definitely the best person to talk with about Chroma-chron, since he developed the system. You can write to Ed, care of Raster Masters, Inc., P.O. Box 92, Crockett, CA 94525*

—Ed.

pencil crunchers

# MAZE BY COMPUTER

In November's ENTER, we wrote about Bela Selendy, a 16-year-old Connecticut student who creates mind-boggling mazes on his school's Apple IIe computer. Bela devised the program for this page's maze in three hours. It shouldn't take you that long to find the one path that leads from enter to exit. *(Answer on page 64)*



LINE DRAWING © NINA WALLACE FROM COMPUTER-GENERATED MAZE © BELA SELENDY

# SCREEN

## CAN YOU MATCH THE

When it comes to home video games, what you see is *not* always what you get.

Far too often, the picture on a game package has little in common with the scene that appears on your screen. Sometimes a great game can be hidden in a silly-looking box, while a bad game is disguised by fantastic pictures on its packaging.

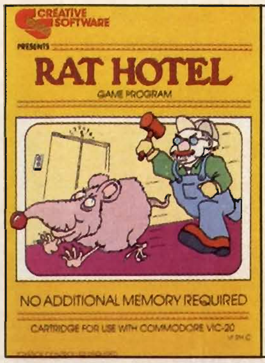
You've no doubt seen game boxes that show sensational superheroes slaying resplendent dragons—only to discover that the hero in the game is a blocky little figure who resembles a toaster with arms and legs. And maybe you've come across an ugly package only to find a wonderful game inside.

Of course, it's not fair to blame the game maker if the package looks better than the scene on the screen. While video game graphics are getting better all the time, they are still quite primitive and cannot match the detail of a photograph or a painting.

Still, there should be some way to tell what you'll get when you buy a new game. Many game makers help by putting a game scene right on the box, but other times, the game packaging just leaves you guessing.

So, as a public service to help you improve your game purchasing skills, ENTER has set up this special matching challenge: Match the game packages on this page with the screen action and descriptions on the next page. There's space for your answers right next to the packages. Can you pass this screen test?

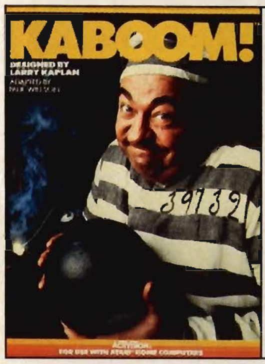
*(Answers on page 64)*


CREATIVE SOFTWARE
PRESENTS
RAT HOTEL
GAME PROGRAM
NO ADDITIONAL MEMORY REQUIRED
CARTRIDGE FOR USE WITH COMMODORE VIC-20

**ANSWERS:**

**SCREEN**

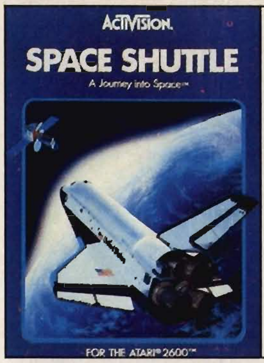
**DESCRIPTION**


KABOOM!
DESIGNED BY LARRY KAPLAN
ACTIVISION
FOR USE WITH ATARI HOME COMPUTERS

**ANSWERS:**

**SCREEN**

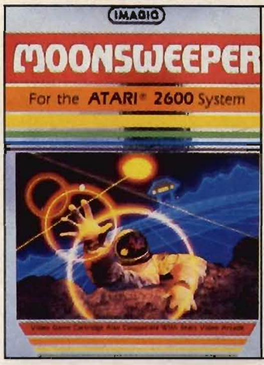
**DESCRIPTION**


ACTIVISION
SPACE SHUTTLE
A Journey into Space
FOR THE ATARI 2600

**ANSWERS:**

**SCREEN**

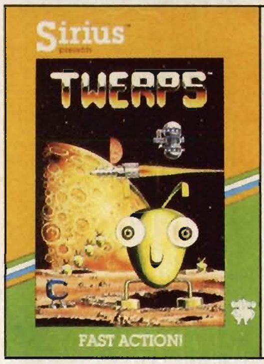
**DESCRIPTION**


IMAGIC
MOONSWEEPER
For the ATARI 2600 System

**ANSWERS:**

**SCREEN**

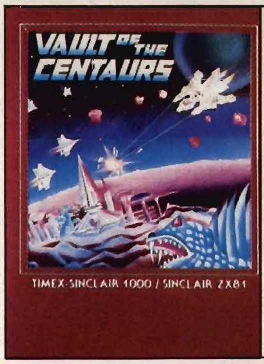
**DESCRIPTION**


Sirius
presents
TWERPS
FAST ACTION!

**ANSWERS:**

**SCREEN**

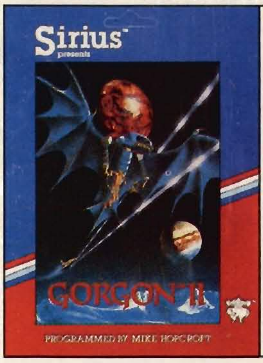
**DESCRIPTION**


VAULT OF THE CENTAURS
TIMEX-SINCLAIR 1000 / SINCLAIR ZX81

**ANSWERS:**

**SCREEN**

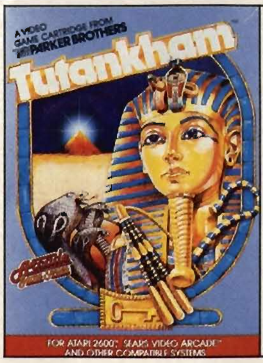
**DESCRIPTION**


Sirius
presents
GORGON II
PROGRAMMED BY MIKE HOPCROFT

**ANSWERS:**

**SCREEN**

**DESCRIPTION**


A VIDEO GAME CARTRIDGE FROM PARKER BROTHERS
Tutankham
FOR ATARI 2600, SEARS VIDEO ARCADE AND OTHER COMPATIBLE SYSTEMS

**ANSWERS:**

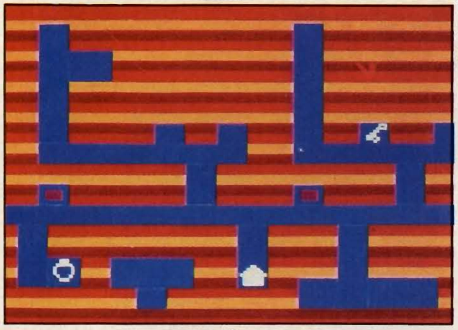
**SCREEN**

**DESCRIPTION**

# TESTS

## NAME WITH THE GAME?

1



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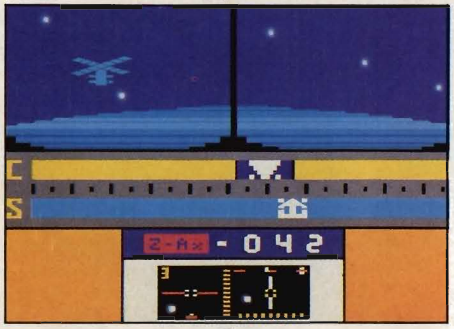

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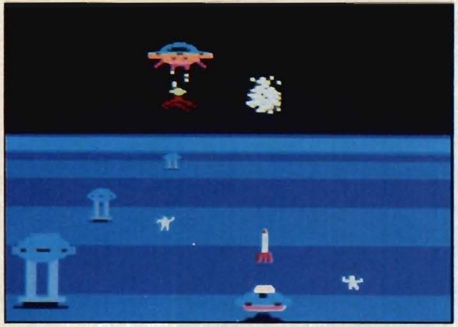

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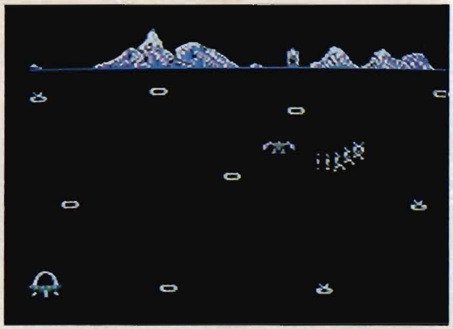

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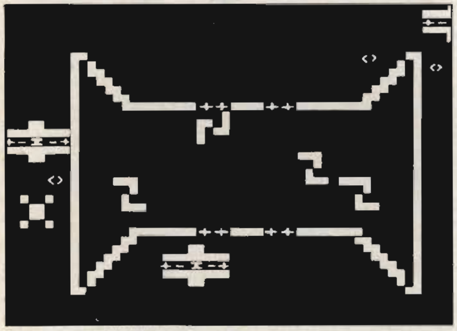

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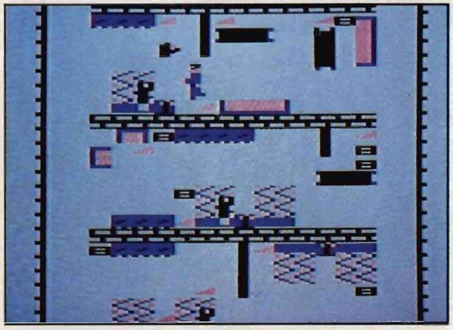

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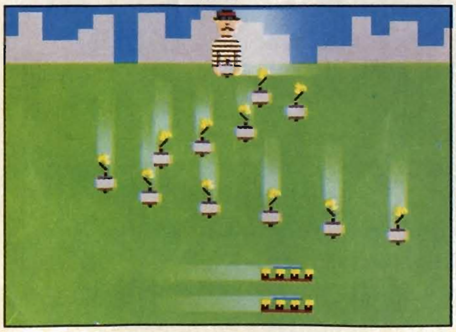

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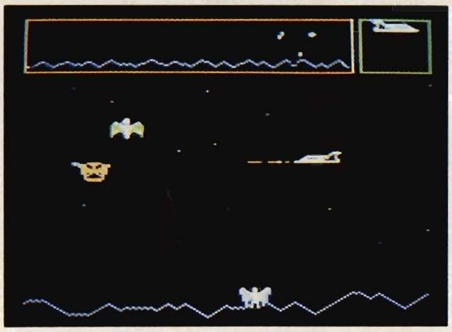


**A** "It's not easy...trying to stay alive when Waldo, the maintenance man, is after you all the time."

**B** "The invaders are ripping through the atmosphere and snatching up helpless humans in their gleaming metallic talons... You vow never to yield while there is still life below."

**C** "...The Mad Bomber... roams the rooftop dropping bombs with lighted, crackling fuses. You try to catch the cascading bombs, foil the Mad Bomber and score points."

**D** "Rescue miners stranded...in Star Quadrant Jupiter! Brave deadly photon torches, space bullets and aurora flares."

**E** "Treasures lure players through a maze of secret passageways in a treacherous expedition to uncover the riches....Players must defeat the protectors and escape —with the loot."

**F** "...A space-age battle. It is your mission to fly your starship Nemus through space, avoiding the deadly meteorites and missiles that are attacking you."

**G** "A whimsical, challenging game with a cast of top starring characters...Thrill at the shooting orbiters! Be amazed by the swooping Glinkas! Gasp in terror at the drooling Gleepnoks!"

**H** "Your mission: launch and achieve orbit, match the trajectory of an orbiting satellite, dock, refuel, re-enter the atmosphere and land."

state of the art

# DISHING UP TV BY SATELLITE

PHOTO COURTESY OF CHANNEL MASTERS

**Down on the farm, satellite dishes bring TV signals to isolated areas.**

### *BY BRAD LEMLEY*

Flipping the dial to find a good TV program can be frustrating, but 14-year-old Kay High says she's never disappointed. "We get about 500 channels at our house," she says. "There's always something good to watch."

While the High family's neighbors in Clarksville, Maryland, get just 10 channels, the Highs get everything from Brazilian soap operas to 24-hour movie channels, from Canadian football to the Disney Channel. In short, they get almost every channel offered by every cable television network in the U.S., Canada, Mexico and South America—yet there is no cable attached to their house.

The secret of the High's super receiving power is in their front yard. There it sits, a TV signal receiver, usually known as a "dish," that is 10 feet in diameter. An electric motor attached to the base of the dish allows the High family to point it at any of 12 communications satellites in orbit above the equator. If, for example, they point their antenna at a satellite called SATCOM 3R, they can pick up Home Box Office, perhaps the most popular cable service. And while people who get HBO through a cable have to pay a subscription fee, Kay and her family tune in on the signal from outer space for free.

The Highs and the 150,000 other American families who own their own satellite reception dishes are eavesdroppers. They are listening in on satellite signals that cable companies use to spread their programs across the nation.

## *Signal Grabbers*

To see how this works, let's follow the HBO signal from beginning to end. It begins in New York City, where HBO's transmitter sends a signal loaded with movies and other goodies up to SATCOM 3R. The satellite "grabs" the signal, amplifies it, and sends it back down in a widespread pattern that covers the whole United States (the area that a satellite's signal covers is called its "footprint").

The signal is then "grabbed" by huge dishes that belong to local cable TV companies in cities and towns across the nation. Finally, these local companies send the program signal zipping through cables to individual homes. Cable subscribers pay a fee, and that's how HBO makes a profit.

But now come people like the High family, who pick up satellite signals with their own dishes for free. Naturally, cable companies are upset about this. They think everyone who gets their programs should pay. Some cable companies even say that in the next year they will start scrambling their satellite signals to stop high-tech eavesdroppers. They say "eavesdropping" is illegal.

The companies that manufacture dishes disagree. They claim that TV signals travelling through the air belong to anyone who can grab them. The disagreement may eventually be settled in court.

But for now, home dishes are becoming increasingly popular. This is largely because they are getting cheaper. Three years ago, a dish cost $10,000 or more. Today, some dishes can be bought as do-it-yourself kits for less than $500. More than 10,000 home dishes are being sold each month. Many companies that sell them, like National Microtech, M/A-Com and Channel Master, Inc., say they can't keep up with the demand.

The demand should grow. The reason can be summed up in two words: Space Shuttle.

The Space Shuttle can carry into orbit satellites that weigh up to two tons. These large satellites can broadcast more powerful signals than current orbiters, and make even bigger footprints on the earth. More powerful signals from space mean that receiving dishes on earth can get smaller and less expensive. In the next five years, the average price of home dishes could go below $300.

Also in the next five years, at least a dozen broadcasting companies plan to begin sending scrambled signals up to satellites, and selling unscrambling devices to people who own receiving dishes. This means a dish family will be able to buy TV shows directly from outer space, without going through a network or local station. This is called a Direct Broadcast Satellite system, or DBS.

PHOTO COURTESY OF M/A COM

**Small dishes fit almost anywhere.**

So what does all of this mean for the "old-fashioned" kinds of broadcasting that requires antennas and cables? Patrick MacDougal of Direct Broadcast Satellite Corporation, one of the leaders in the field, says he expects traditional TV to continue in big cities for many years. "The biggest use for dishes will be in suburbs and rural areas—places that have trouble receiving good signals with antennas and that are too expensive to link up with cables."

Today, though, a home dish is still a fairly rare thing. For Kay High, this has yielded an unexpected side benefit: popularity. "My friends really like to come over and watch MTV (Music TeleVision, a 24-hour video rock music network). I'm the only one who can get it. There's no cable in this town at all, so a dish is really good to have."

---

*BRAD LEMLEY is a science writer who lives in Washington, D.C.*

## PROGRESS REPORT: SATELLITE DISHES

***WHAT THEY ARE:*** Video receiving dishes, also known as earth stations, gather electronic signals beamed down from satellites which orbit above the Earth. These electronic signals, which contain TV pictures and sound, are then transmitted by wires from the dish to a TV set. Viewers with dishes may have access to as many as 500 different channels.

***HOW MUCH THEY COST:*** A kit for building a video receiving dish can be purchased for as little as $500. A higher-quality dish with a remote control device for aiming can cost as much as $10,000. Dishes are also available for a range of prices in between.

***WHERE TO GET THEM:*** Dishes are sold at many stores that sell regular TV antennas. They are also available by mail from electronics supply companies.

***WHAT'S NEXT:*** In the next five years, video receiving dishes will continue to get smaller. Today's 10-foot diameter dishes will be replaced by 3-foot diameter dishes with equal receiving power. Costs will also decrease, with dishes available for as little as $200. In rural areas, dishes may outnumber normal TV antennas by the year 1994. However, court cases may still come up that will affect their use.

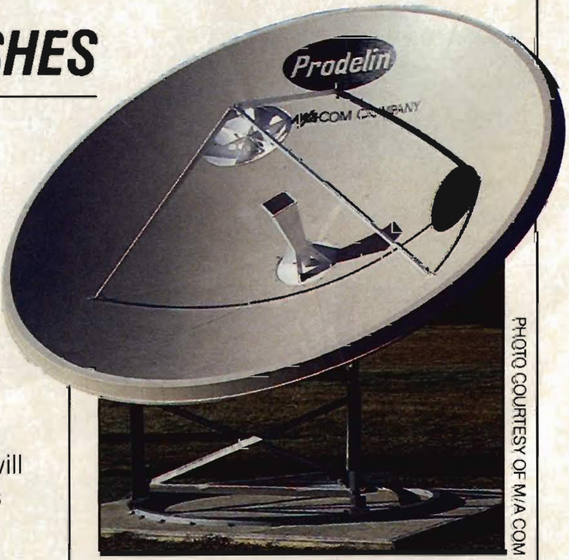


PHOTO COURTESY OF M/A COM

# Next

## HERE'S WHAT'S COMING IN THE MARCH ISSUE OF ENTER:

**COMPUTER BREAK-INS:** What *really* happened when seven kids from Milwaukee were caught breaking into mainframe computers? An exclusive ENTER interview with one of the young Milwaukee hackers takes you from the break-ins to the morning the FBI agents appeared at the door—and looks at the aftermath of these teenage computer capers.

**THE LATEST AT THE ARCADES:** A new generation of games is about to hit the arcades, and it's unlike anything you've seen. Find out about the laser disc animation of *Cube Quest,* the computer-created landscapes of *Star Rider* and other new games.

**COMPUTER CAMPS: HYPE OR HELPFUL?** Computer camps around the country are selling their places as the best. How can you choose between a quality camp and a possible rip-off? What about summer classes or computer clubs? We talk to kids who've been computer campers, computer counselors, and teachers, and help you pick the best way to learn about bits and bytes this summer.

**PLUS:** A look at TV's hacker show *Whiz Kids,* an interview with the kids who make up the Atari Youth Advisory Board, programming for Commodore, Atari, TRS-80, Apple and T.I. computers, a win-a-computer contest, and much more!

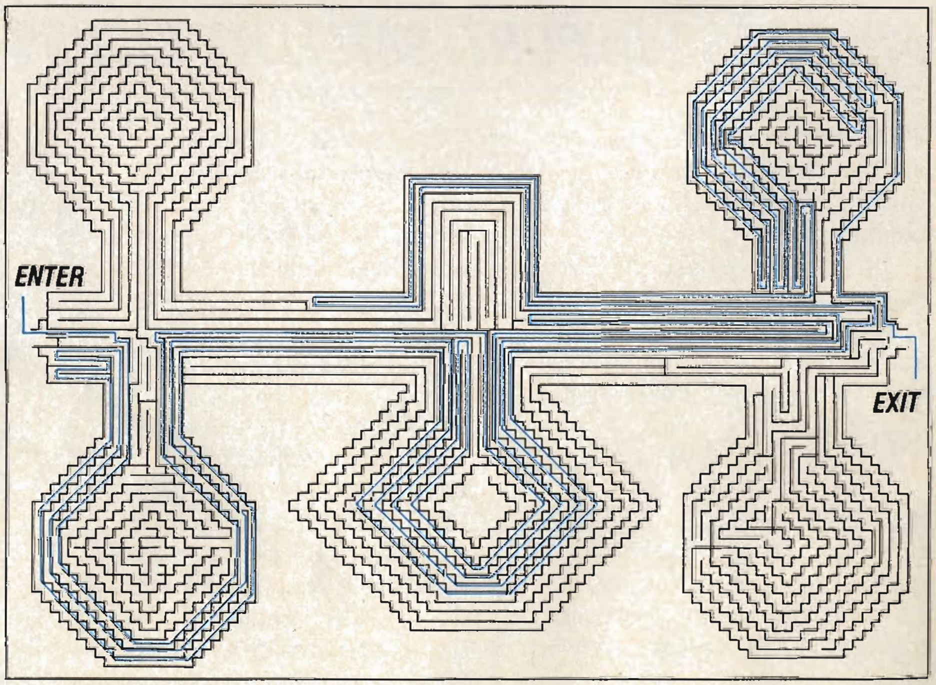
**CORRECTION:** *Our apologies to all who contributed photographs to our story* First Down and 10K to Go *(Dec./Jan.). Credits should have read: Opening photo © Focus on Sports; Computer enhanced by Digital Effects. All other photos © Kipp Baker.*

# answers

## SCREEN TEST *(page 60)*

| | | |
|---|---|---|
| **Rat Hotel:** | 6 | A |
| **Space Shuttle:** | 2 | H |
| **Twerps:** | 4 | G |
| **Gorgon II:** | 8 | B |
| **Kaboom!:** | 7 | C |
| **Moonsweeper:** | 3 | D |
| **Vault of the Centaurs:** | 5 | F |
| **Tutankham:** | 1 | E |

## MAZE BY COMPUTER *(page 59)*



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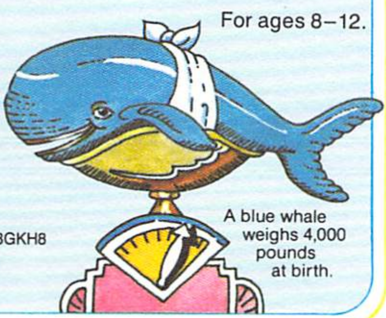

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# HELENA ON CREATIVITY.

| | |
|---|---|
| Name: | Helena Paoli |
| Age: | 9 |
| Home: | Belvedere, California |
| School: | Bel Aire |
| Hobbies: | Drawing, playing with dolls, reading, swimming |
| Ambition: | To be a fashion designer |
| Favorite software: | Creature Creator™ by DesignWare |

"I like *Creature Creator* because it's kinda like drawing – only the pictures are alive! I can make different creatures, and then make them do lots of different dances.

"Lots of games – well, you just keep shooting or dodging things until you learn the pattern. Then you can beat it easily, and you get bored.

*"Creature Creator* lets me use my imagination. Now a couple of kids have it, so we get together to compare the creatures and monster dances we've made."

**DESIGNWARE ON CREATIVITY.** Children learn the most through creative problem solving. That's why *Creature Creator,* like so many DesignWare games, is an open-ended exercise that challenges and nourishes young minds. In a way that's a lot of fun.

DesignWare programs go far beyond putting a sugar coating on rote drills; they encourage kids to draw on something they just happen to have an unlimited supply of – imagination!

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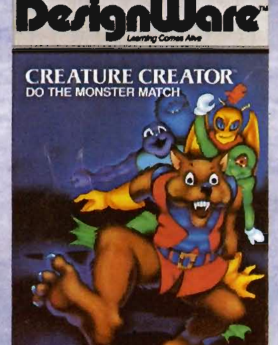
As Helena Paoli says, "Mom, Dad – look what I've created now!"



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